Handout Reference 1

NFPA 805 Pilot Observation Visit
Trip Report - ML061500468
March, 2006

NFPA 805 Pilot Observations Meeting Progress Energy Transition Status

Meeting Topic 2, March 27, 2006

Jeff Ertman, CES
Mike Fletcher, HNP
Richard Hightower, RNP
Tony Maness, HNP
Jack Curham, CR3
Steve Hardy, BNP

NGG Nuclear Generation Group

Progress Energy

PE NFPA 805 Transition Status Discussion Points

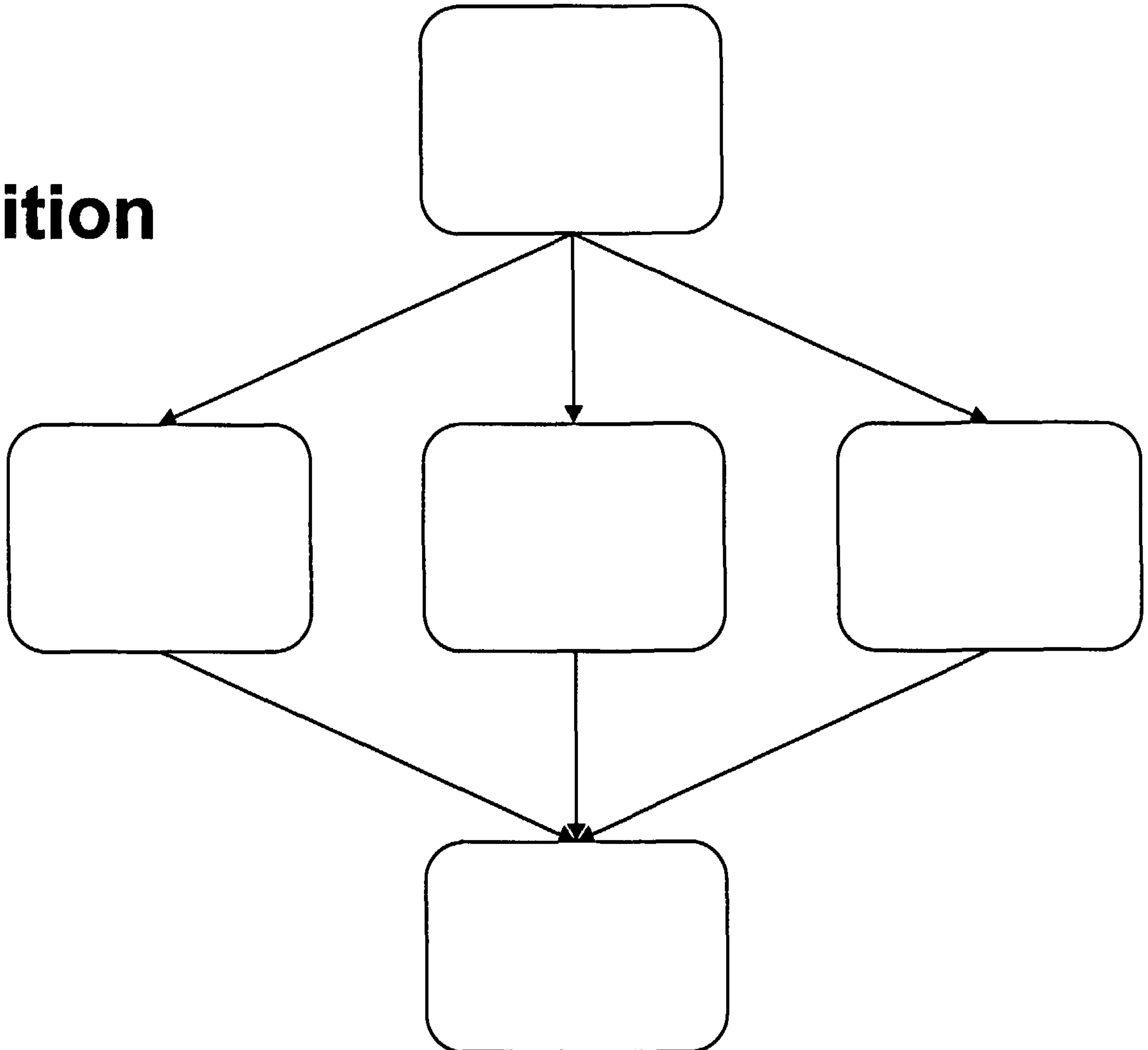
- General project information
- Harris Transition plant status
- Transition status other PE plants
- PE plans to address generic letters
- Summary of outlook next six months
- PE Goals of the Meeting

PE NFPA 805 Transition Status
General Information - Scope

- Project Scope includes three major work areas
  - Complete SSA/Appendix R Reconstitution (started in 2003) primarily using NEI 00-01 as guidance
  - Develop Fire PRAs using NUREG 6850 as guidance and revise Internal Events PRA to support it
  - Transition to 10CFR50.48(c) / NFPA 805 using NEI 04-02 Guidance
-

PE NFPA 805 Transition Status
General Information - Priorities

- SSA Validation
- NFPA 805 Transition
- Modifications



PE NFPA 805 Transition Status
General Information - Goals

- Transition to risk informed, performance based licensing basis for an improved safety focus
- Establish a common Fire Protection Program across fleet – as soon as practical
- Address recent NRC guidance relative to SSA Circuit Analysis and Manual Operator Actions
- Address PE Hemyc applications
- Advance Fire Protection and PSA personnel skill and knowledge

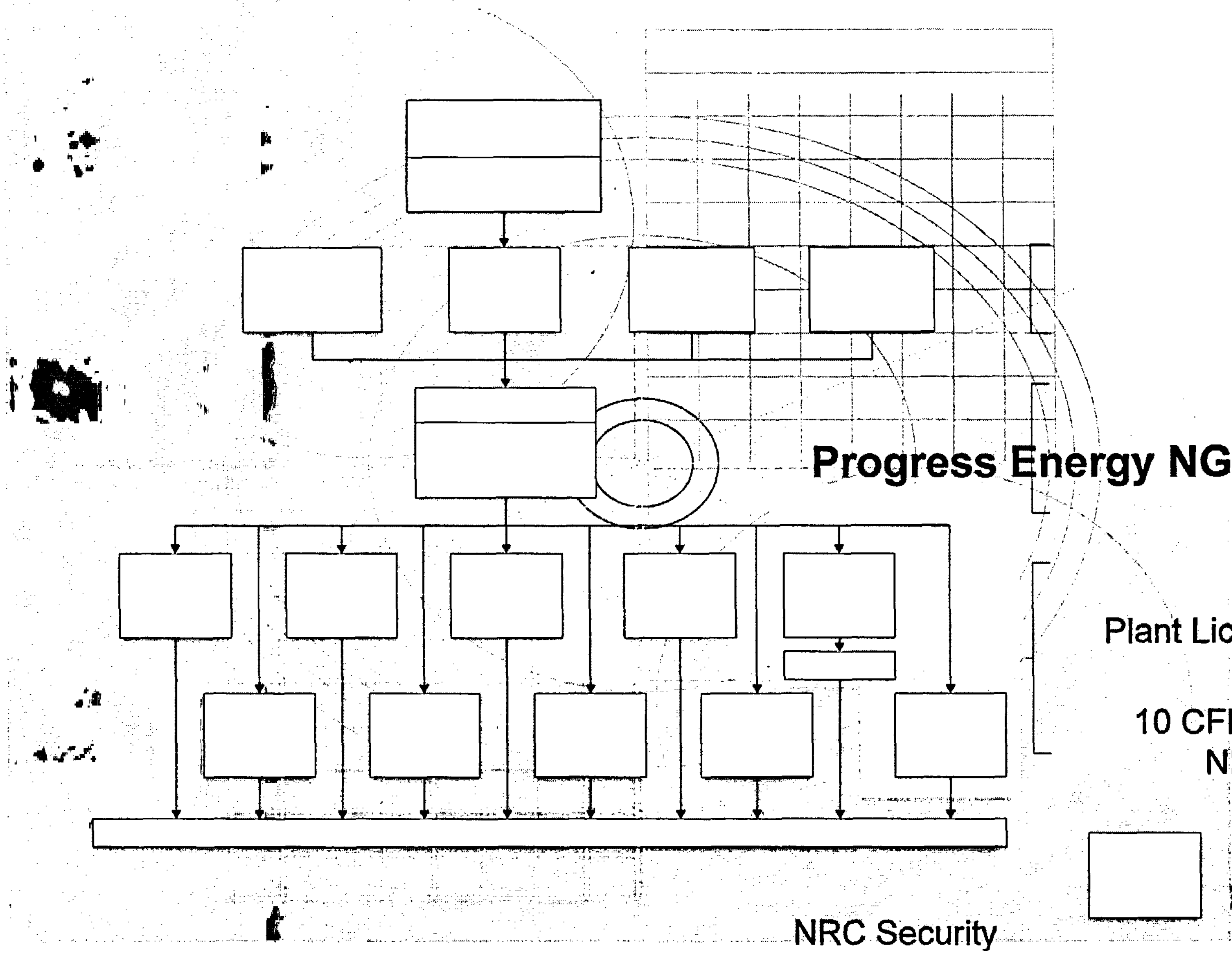
PE NFPA 805 Transition Status
General Information – Fleet Plan

- HNP LAR June 2008
- CR3 LAR August 2009
- RNP LAR August 2010
- BNP LAR August 2011

PE NFPA 805 Transition Status
General Information – Project Planning

- *Rolling Wave* project planning method utilized
  - Plan includes all four plants
  - Lessons learned from lead plant will be applied across the fleet
- Dedicated resources at corporate level
- Committed resources at site level
- Funding at the Fleet Initiative level

PE NFPA 805 Transition Status
General Information - Target



Harris NFPA 805 Transition Status
SSA Validation Update

- 14 SSA Validation Tasks
  - Majority of Tasks Completed
  - Final Task Scheduled Complete 5/31/06
  - EC Approval
- Revised Analysis – Prior to NFPA 805
  - Procedure Updates
  - Operations Training
  - Implement Selected Modifications

Harris NFPA 805 Transition Status
SSA Validation Deficiencies

- Selected Modifications Needed Due to:
  - Required SSD Cables Affected By Fires
  - Non-feasible Manual Actions
  - Compliance
    - Lighting
    - Manual Actions Not Approved

Harris NFPA 805 Transition Status
SSA Validation Deficiencies

- R12 (on line) - 5 Modifications
- R13 (on line) - 7 Modifications
- R14 (on line) - 17 Proposed Modifications
  - 10 High Operational Impacts (PNSC Concurred)
  - 7 Medium Operational Impacts (PNSC Follow up)

Harris NFPA 805 Transition Status SSA Validation Deficiencies (cont)

- R15 – R16 - Remaining Deficiencies
  - Approximately 15 Potential Modifications
  - NFPA 805 Impact - Disposition additional proposed deviations and potential manual actions

Harris NFPA 805 Transition Status
NFPA 805 Transition

- Current and Near Term Activities
  - NFPA 805 Chapter 3 Manual Firefighting Transition
  - Fire PRA Fire Ignition Source Walkdowns
  - Internal Events Gap Assessment
  - Establish FP QA Interfaces with Fire PRA Quality requirements

Harris NFPA 805 Transition Status
Hemyc – Current Status

- ≈ 6500 ft Hemyc and 1250 ft MT
- Hemyc rating is indeterminate based on NEI test / NRC MT test not applicable to HNP
- Comp measures on Hemyc is hourly fire watch with increased controls for transient combustible, same areas as SSD deficiencies.
- MT not considered inoperable but hourly fire watch is in place for conservatism.

Harris NFPA 805 Transition Status
Hemyc – PE Generic Letter Response

- Due out in 1st Qtr 06 with a 30 day and 60 day response
- 30 Day response will identify need for completion extension past December 07 due to NFPA 805 transition
- 60 day response will provide detailed information on applications, compensatory measures, impact on plant safety and resolution plan
- Safety impact evaluation plan includes the following:
  - Utilize methods described in the "Risk Significance of Hemyc Electrical Raceway Fire Barrier System Failures", by Raymond Gallucci
  - Utilize the aggregate risk determination process developed by HNP.

Harris NFPA 805 Transition Status
Hemyc – Three Phase Resolution Plan

- Phase One –Establish Fire Barrier Worth
  - Testing barriers to GL 86-10 S1. MT test scheduled for May 06. Hemyc tests tentatively schedule for July 06.
  - Testing will address plant specific configurations not included in NRC or NEI tests.
  - Testing will be used to apply a barrier rating to the Hemyc and MT applications.

Harris NFPA 805 Transition Status
Hemyc – Three Phase Resolution Plan

- Phase Two – Evaluate Fire Barriers
  - Will use NFPA 805 Change Process
  - Acceptable applications adequate for hazards addressed per NFPA 805, NEI 04-02

Harris NFPA 805 Transition Status
Hemyc – Three Phase Resolution Plan

- Phase Three – Post NFPA 805 Mods
  - Will address any applications found not acceptable in Phase 2
  - Will begin modification process soon a applications are identified
  - Modifications may include alternatives such reroute of circuits, replacing ERFB with another fully qualified system, addition of components or use of Meggitt fire rated cable.

Robinson NFPA 805 Transition Status SSA/Appendix R Validation

- SSA Validation Project is preliminary step to for development of LAR and transition to NFPA-805
  - CAFTA Fault Tree Logic has been developed
  - Electrical Circuit Analysis Task to complete second quarter 2006.
  - Safe Shutdown Database (which includes additional electrical cables resulting from Circuit Analysis) to be complete second quarter 2006.
  - Fire Area Compliance Analysis using CAFTA and new Database to commence Second quarter of 2006.
  - Transition Analysis for NFPA 805 to commence mid 2007.

Brunswick NFPA 805 Transition Status
SSA Validation Deficiencies

- Safe Shutdown Revalidation
  - Safe Shutdown Equipment List Complete
  - SSEL Circuit Analysis Complete
  - SSA Database Life Cycle Document Complete
- Planned 2006 Activities
  - Perform Engineered Safety Features Evaluation
  - Perform Raceway Validations
  - Conduct SSA Compliance Strategy Evaluations

Crystal River 3 NFPA 805 Transition Status

- SSA Validation Project Status:
  - CAFTA Fault Tree Logic has been developed.
  - Electrical Circuit Analysis Task will complete second quarter 2006.
  - New Safe Shutdown Database will also be completed second quarter 2006.
  - Fire Area Compliance Analysis using CAFTA Fault Tree Logic and the new Safe Shutdown Database will commence the second or third quarter of 2006.
  - Transition Analysis for NFPA 805 to commence late 2006 to early 2007.

PE NFPA 805 Transition Status
PE plans to address generic letters

- **Generic Letters, other Scheduled responses:**
  - Hemyc (draft)
    - 30 day response as a Fleet
    - 60 day HNP, RNP
  - Circuit Analysis (draft), multiple spurious
    - Fleet response planned
  - Manual Actions FRN, 6 months to develop plan
    - Fleet response planned

PE NFPA 805 Transition Status Summary - Outlook Next 6 Months

- Continue SSA Area Analysis at all plants in prep for NFPA 805 Fire Area Transition
- Harris Chapter 3 Transition in full swing by end of 2006
- Harris Fire PRA Equipment Selection and related tasks
- Respond to Generic Letters/FRN:
  - Hemyc GL
  - Circuit Failures GL
  - Manual Actions corrective action plan

PE NFPA 805 Transition Status
Goals for This Meeting

- Resolution of Parking Lot items
- Discussion of specific transition technical areas:
  - Chapter 3, Manual Firefighting
  - FP Quality requirements vs. PSA Quality
  - FP/Appendix R performance criteria vs. PSA success Criteria
- Identification of new Parking Lot items
- Items that require additional communications with the staff

Handout Reference 2

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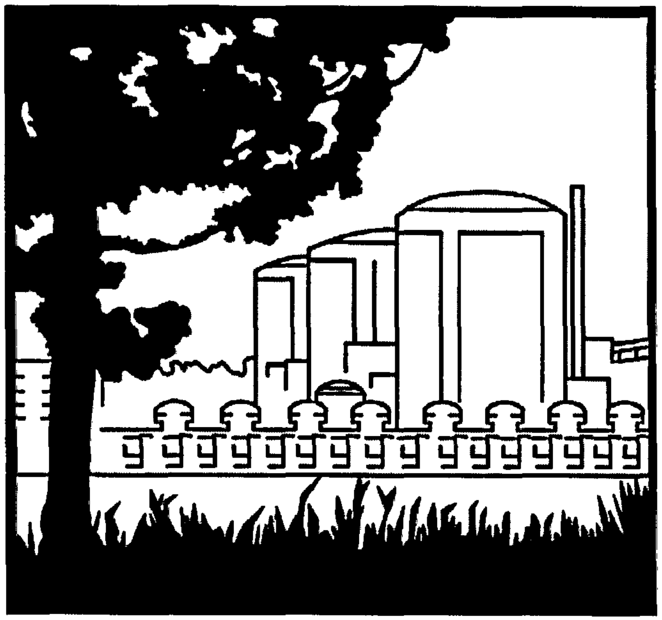


Duke Power NFPA-805 Transition Pilot Observation Project Status

Oconee (ONS)

Harry Barrett

March 27, 2006

Agenda

- Reconstitution Project Status
- NFPA-805 Project Status
- Fire PRA Status
- Duke 3-Site Transition Schedule
- Oconee Transition Schedule
- Near Term Tasks

Reconstitution Project Status

- All three sites have funding approved with contracts in place
- ONS Unit 2 /Common Reconstitution Analysis is complete
- MNS is approximately 70% complete with expected completion date of Sept 2006
- ONS Unit 3 is approximately 50% complete with expected completion date of August 2006
- CNS is approximately 26% complete with expected completion date of June 2007

NFPA-805
Transition Status

- Nuclear Safety Performance Criteria Transition (Chapter 4)
  - Have completed mapping Appendix R (NEI 00-01) methodology to NFPA-805
  - Looking at more effective ways to present this information
    - Table format may not be most effective way to communicate methodology
    - Looking at possibility of using Engineering Guidance Document as vehicle to record method

NFPA-805 Transition Status - continued

- Nuclear Safety Performance Criteria Transition (Chapter 4) – continued
  - Completed Oconee Multiple Spurious Operations (MSO) Expert Panel
  - Working on Recovery Action Feasibility
- Non-Power Operational Mode Transition
  - Developed Philosophy and Methodology
  - Working on final list of components to be added to the Appendix R Safe Shutdown Equipment List (SSEL) for additional analysis

Fire PRA Status

- Sub-Task 5.1 - Plant Boundary Definition and Partitioning
  - Complete. Need to complete documentation. Will be included in the Fire Ignition Frequency Calculation
- Sub-Task 5.2 - Fire Ignition Frequencies
  - Complete.
  - Transient Fire Calculation is complete
- Sub-Task 5.3 – Fire PRA Component Selection
  - In Progress. Completed BEMAP (PRA to Basic Event Mapping)
  - Still working on evaluating the differences between Appendix R (ARTRAK) database and PRA
  - Recommendations for additional tracing of non-Appendix R, PRA components is complete
- Sub-Task 5.4 - Fire PRA Cable Selection
  - Waiting on final component list from Sub-Task 5.3
- Sub-Task 5.5 - Qualitative Screening
  - Not going to perform Qualitative Screening (will quantify all Fire Compartments)

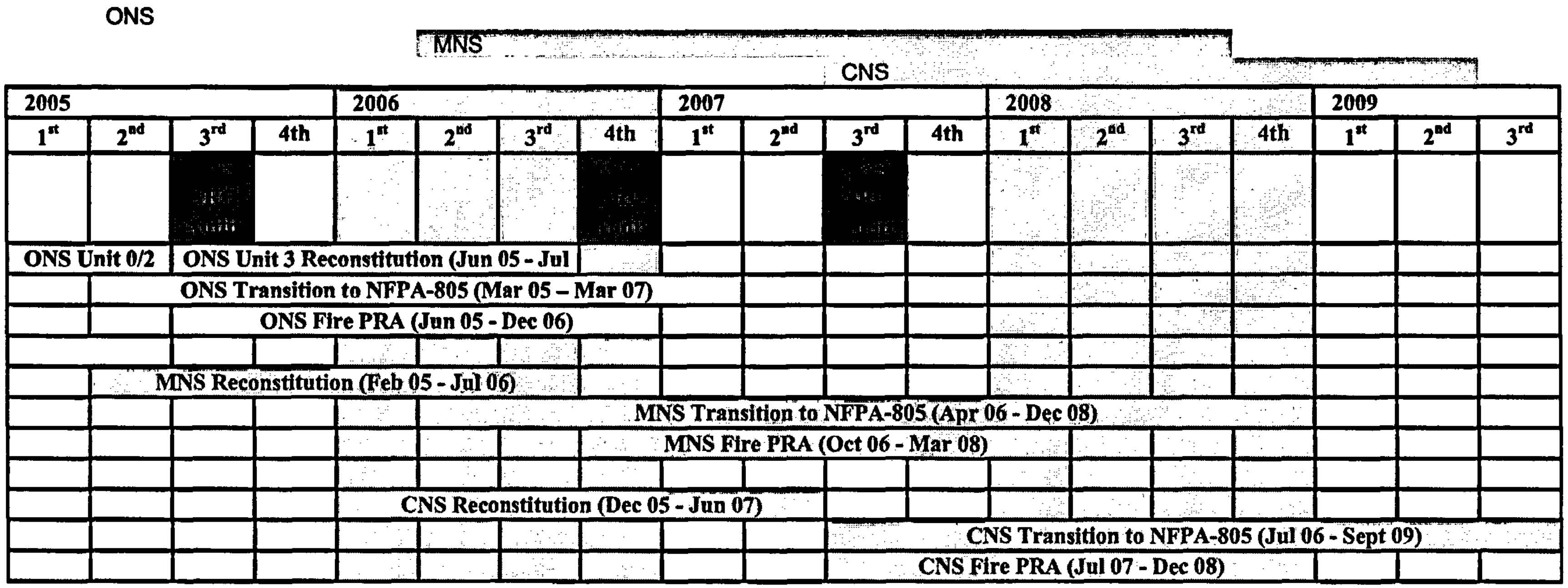
Fire PRA Status

- Sub-Task 5.6 - Fire-Induced Risk Model
- Sub-Task 5.7 - Quantitative Screening
- Sub-Task 5.8 - Scoping Fire Modeling
- Sub-Task 5.9 - Detailed Circuit Failure Analysis (combined w/ 5.10)
- Sub-Task 5.10 - Circuit Failure Mode Likelihood Analysis
- Sub-Task 5.11 - Detailed Fire Modeling
- Sub-Task 5.12 - Post-Fire Human Reliability Analysis
- Sub-Task 5.13 - Seismic-Fire Interactions Assessment
- Sub-Task 5.14 - Fire Risk Quantification
- Sub-Task 5.15 - Uncertainty and Sensitivity Analysis
- Sub-Task 5.16 - Fire PRA Documentation

Armored Cable Fire Testing

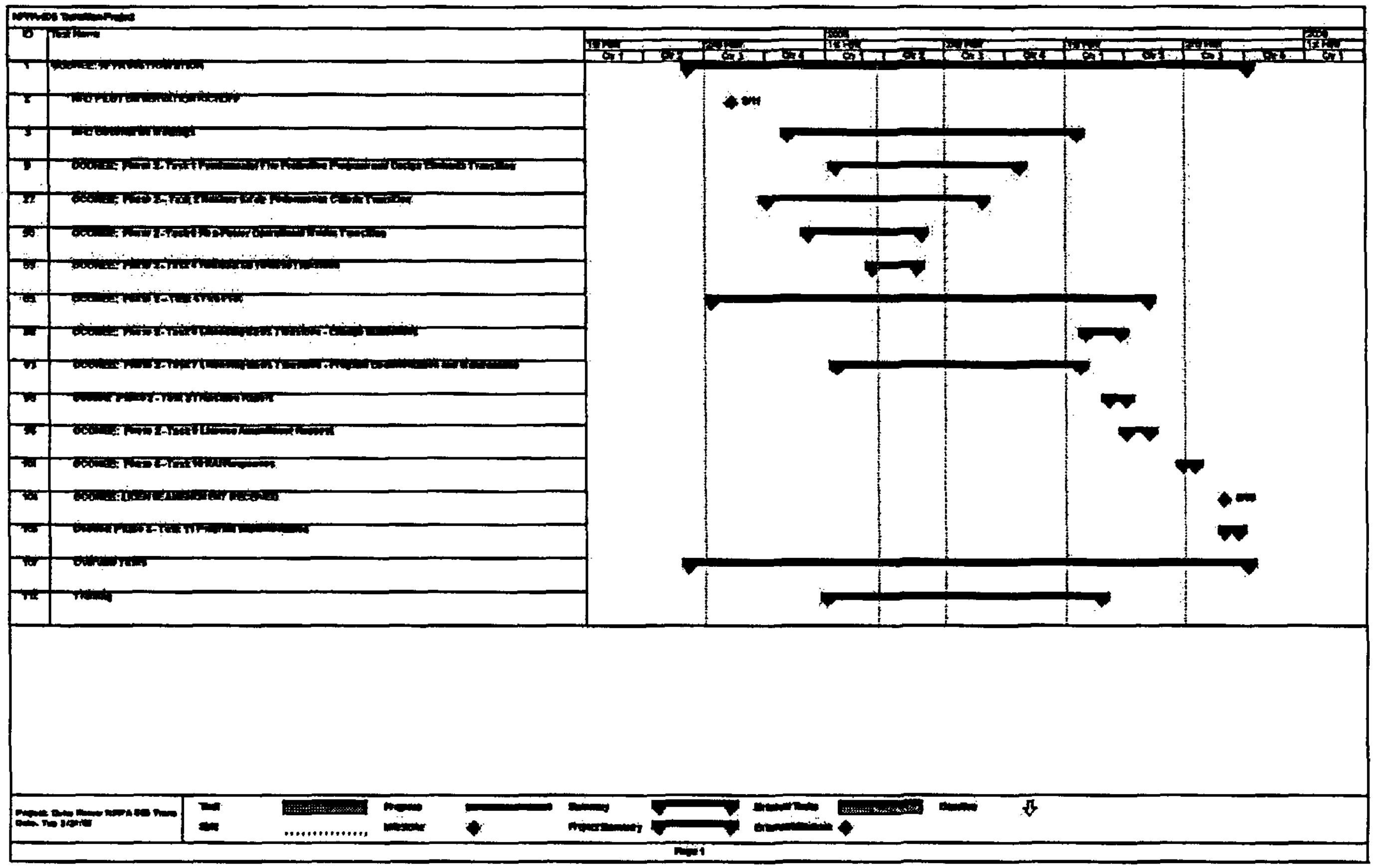
- We are in the final preparations to perform additional fire damage testing to more accurately determine spurious actuation probabilities for our armored cable
  - Testing will be performed at Intertek Testing Laboratories (Omega Point Labs) in Texas
  - Test Plan was reviewed and commented on by NRC
  - Testing will likely occur in late April or early May
  - NRC will have opportunity to observe

Duke 3-Site Transition Schedule



MNS and CNS Fire PRA Tasks have been extended by 6 months due to Peer Review
MNS and CNS Transition have been extended 9 months beyond PRA to allow time for addressing major peer review issues and submittal of LAR

Oconee NFPA-805 Transition Schedule



Near Term Tasks
(Next Six Months)

- Armored Cable Fire Testing (2nd Qtr 2006)
- Chapter 3 Non-Fire Area Specific Transition
- Transient Analysis
- Manual Action Feasibility
- CAFTA Logic Pilot

Handout Reference 3

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Duke Power Fire PRA and Status of the ANS Fire PRA Standard

Dennis Henneke
Brandi Weaver
Duke Power Company

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Outline

- Duke Armored Cable Testing.
- Multiple Spurious – review for the new folks.
- SSA Scope versus PRA Scope – some initial results.
- ANS Fire PRA Standard - Status

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Armored Cable Fire Testing

Variable	Base Tests 1 - 4	Tests 5 – 8	* Tests 9 - 12
Cable type (# of conductors)	8/c	8/c	8/c
Cable armor overall Jacketed or Un-jacketed	Jacketed	**Unjacketed**	Jacketed
# of rows of fill within the tray	3	3	3
# of monitored cables in rows 1, 2, and 3	3, 2, 3	3, 2, 3	3, 2, 3
Control power source description	120 VAC CPT secondary winding, Ungrounded	120 VAC CPT secondary winding, Ungrounded	120 VAC CPT secondary winding, **Grounded**

Armored Cable Fire Testing

Variable	Tests 13 - 16	Tests 17 - 20
Cable type (# of conductors)	8/c	**37/c**
Cable armor overall Jacketed or Un-jacketed	Jacketed	Jacketed
# of rows of fill within the tray	3	2
# of monitored cables in rows 1, 2, and 3	3, 2, 3	1, 1
Control power source description	**125 VDC Source** (Ungrounded)	120 VAC CPT secondary winding, Ungrounded

Cable Testing

- **Tests 9-12:**
  - 8 Circuits per test.
  - Re-baseline EPRI Failure Probability (0.075) for grounded circuit with CPT. Should provide better certainty.
- **Tests 1-4:**
  - Similar to 9-12, but ungrounded. Expect value to be higher.
- **Tests 5-8:**
  - Repeat of 1-4, but unjacketed. Jacket should have no effect.
- **Tests 13-16:**
  - 125 VDC. Similar to 1-4 above, but DC with Circuit Breaker Close and Trip Coils.
- **Tests 17-20:**
  - Large Conductor (4 circuits per cable), ungrounded. Determine if multiples within a given cable are more likely. SDP assumes full dependency. NUREG/CR-6850 assumes independent.

Multiple Spurious – LB Review for the new folks

- A new Risk-Informed License Basis (LB) is discussed in NEI 04-02, Appendix B.2.1
  - Key to this approach is the complete analysis of multiple spurious in the Fire PRA.
- The proposed new LB for multiple spurious is listed:
  - "The Safe Shutdown Analysis shall address all single spurious and all potentially risk-significant multiple spurious failures.

Multiple Spurious - LB

- Potentially risk-significant was initially defined as follows:
  - Risk is above Reg. Guide 1.174 criteria (CDF >1E-06, LERF > 1E-07), prior to operator response.
  - Defense-in-Depth (DID) or Safety Margins are inadequate per NEI Implementation Guide, prior to operator response.

Multiple Spurious - LB

- New Multiple Spurious scenarios identified are considered outside the license basis, until they are determined to be potentially risk significant.
- Gray Area: Multiple Spurious Combinations that do not meet the "Potentially Risk Significant" Criteria, but have an estimated CDF risk > 1E-08/year (LERF > 1E-09/year), are treated as follows:
  - Design change or procedure change put in place, if possible
  - Procedural actions still meet feasibility criteria, but actions are not considered "required."

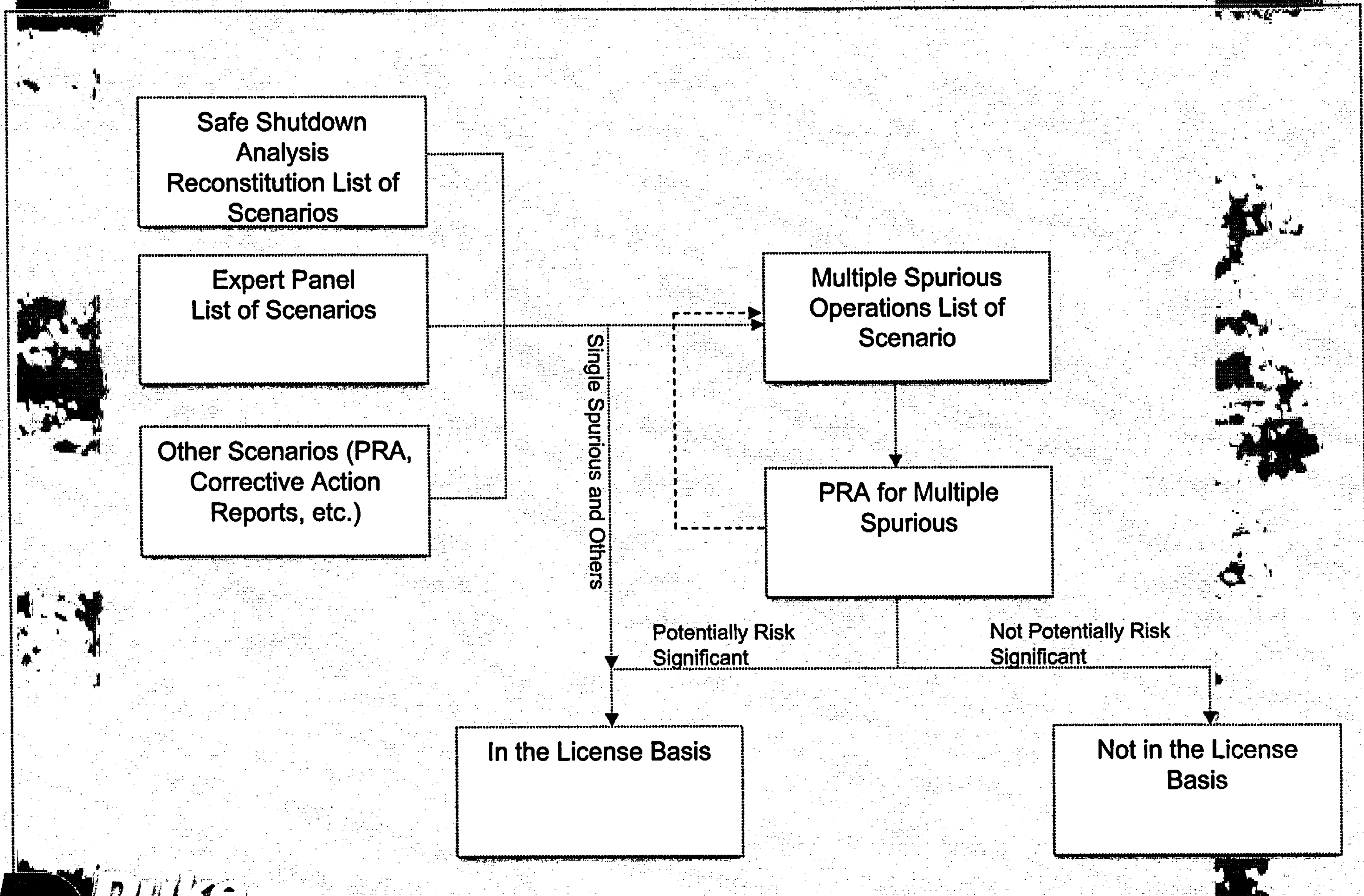
Multiple Spurious - LB

- Affect of the proposed License Condition (Post-transition):
  - Since 1E-7/year to 1E-06/year area includes credit for manual actions, the only multiple spurious reported would be:
    - Multiple spurious in the grey area, with no solution.
  - Multiple spurious above or in the grey area that have a deterministic solution, are not considered changes:
    - If a III.G.2 manual action is used, then the manual action is a change and would be subject to the License Condition, if above 1E-7/year CDF (1E-08/year LERF).

General Method for Modeling Spurious Operation in the PRA

- Three general inputs to ensure PRA comprehensively models multiple spurious operations:
  - Fire Safe Shutdown Reconstitution components and scenarios
  - Present PRA modeling, including scenarios and components
  - Expert Panel Input

Dispositioning of Multiple Spurious



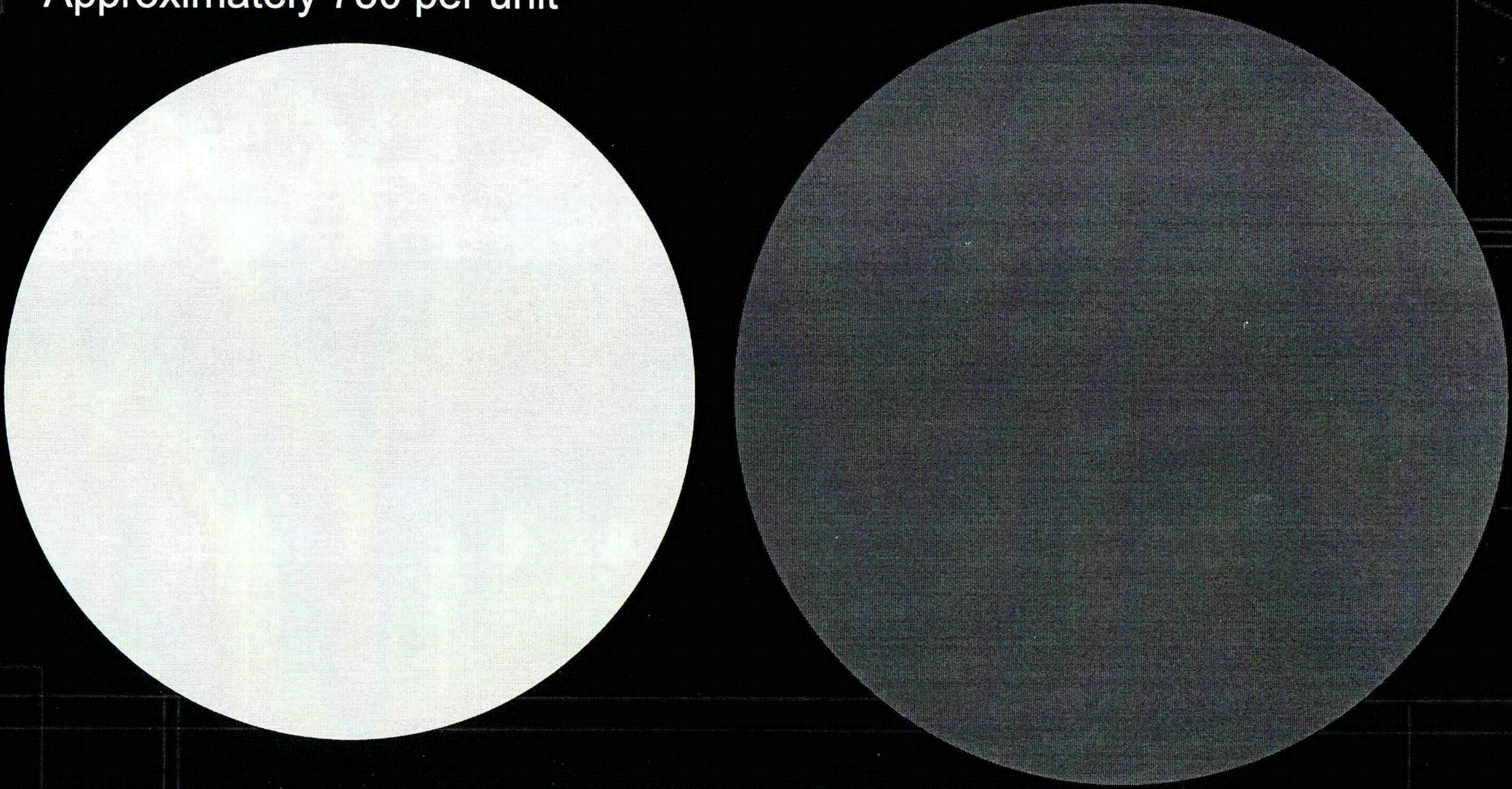
General Method for Modeling Spurious Operation in the PRA

- Expert Panel Review complete:
  - New Scenarios were identified for consideration in the Fire PRA. For example:
    - Loss of RCP Seal Injection and loss of cooling to a single Seal
    - Loss of Cooling to Letdown Heat Exchanger
    - SG Overfeed via Main Feedwater
    - Boron Dilution through Bleed Transfer (3 spurious).

PRA Scope Versus SSA

Appendix R SSEL Components
Approximately 750 per unit

PRA Components
Approximately 1500 per unit



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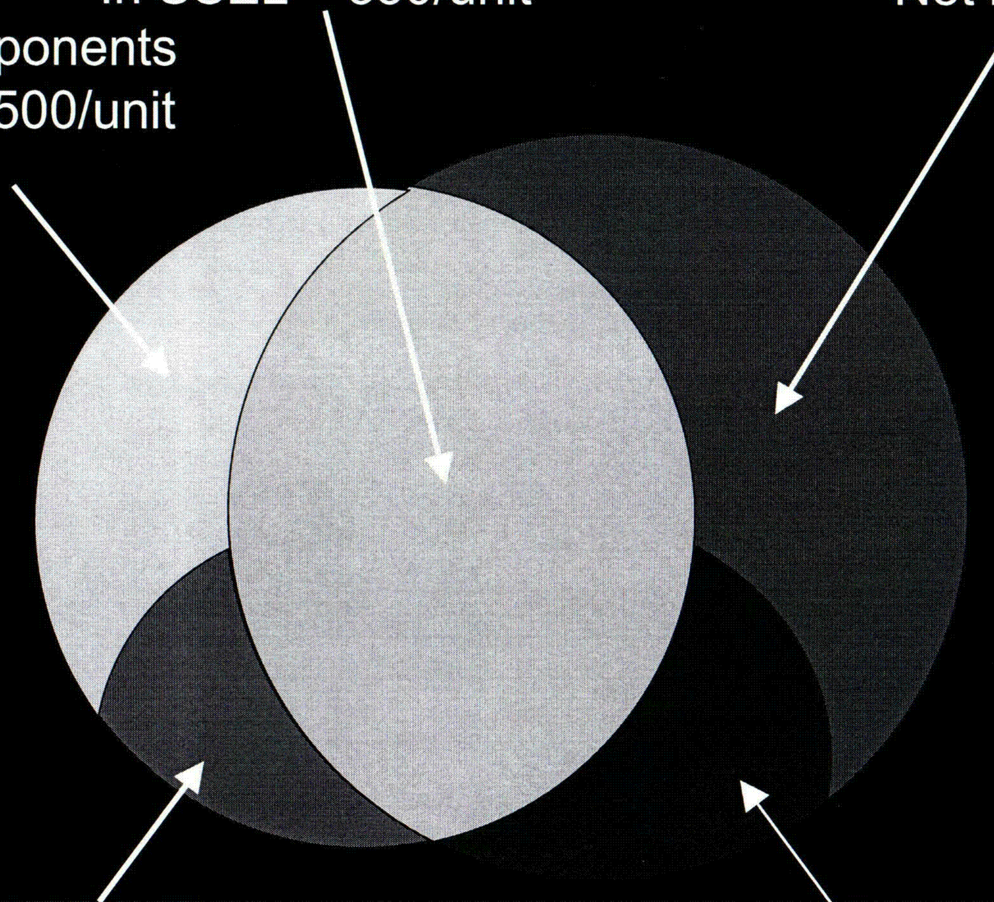
PRA Scope Versus SSA



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PRA Scope versus SSA

- Area 1: A large percentage of SSA Components (electrical) are in the PRA. Affect of fire on the PRA is modeled directly through a component to basic event mapping (complete).
  - Spurious Operation is initially assumed in the PRA, unless the SSA says it can not happen.
  - Over ½ of the SSA components are modeled in the PRA.

PRA Scope versus SSA

- Area 2: SSA Components not modeled in the PRA will be reviewed to determine why it is not in the PRA:
  - Cold Shutdown
  - Supports a PRA component
  - Operator Actions: Review of effect on Operator actions is required by NUREG/CR-6850.
- Review of Area 2 not complete.

PRA Scope versus SSA

- Area 3: PRA Components not in the SSA will need to be treated in one of several ways:
  - PRA component is not in sequences that are fire-induced (SG Tube Rupture). Nothing required.
  - Assumed to Fail for all fires (spurious included).
  - Assumed routing per NUREG/CR-6850 rules.
  - Perform Cable Routing (Area 3a):
    - Likely for important PRA components.
    - May need to iterate, once detailed scenario analysis is performed.
    - May end up moving important 3a components into area 1 by adding them to the SSA SSEL.

PRA Scope versus SSA

- Initial review of PRA components not in the SSA shows roughly the following:
  - 50% are Manual Valves, Check Valves, etc.
  - 20% were actually traced (see next page).
  - 20% were low F-V, Low RAW for CDF and LERF.
    - Use 0.001 F-V and 1.01 RAW, with some verification: CCDP < 1E-03, CLERP < 1E-04.
  - 10% need to be traced.

PRA Scope versus SSA

- During the review, several issues were identified:
  - Unique nomenclature for some SSA components:
    - Adjust the PRA mapping, as needed.
  - SSA list does not include a list of all sub-components:
    - Relays for auto-start of pumps. Cables were listed against the pump breaker, but PRA lists the relays and breaker as separate components.
    - About 20% of PRA components not in SSA were determined to be actually traced.

ANS Fire PRA Standard

- ANS Fire PRA Standard development started in mid-2002.
- Writing group includes Utility, NRC, National Labs, and Contractor Support.
  - Most Key Members from NUREG/CR-6850 development.
  - Several Key Members on NFPA-805 Pilot Project.
  - Both a Writing and Separate Review Group
- Working Drafts have been issued for review.

ANS Fire PRA Standard

- The Standard is scheduled to be released for public comment on April 6th.
  - Will go through simultaneous ANS balloting and public comment.
  - Will require re-submitting final version to ANS.
  - Public Comment Period is 60 days.
- Based on recent External Events and Shutdown Standard Experience, we do not expect quick turn-around following public comment is complete.
- Optimistically, we should have a final version by the end of 2006.

ANS Fire PRA Standard

- Couple of Details:
  - Category II/III looks a lot like NUREG/CR-6850.
  - Appendix B (and Section 1.6) describe that a Category II PRA does not have to have all scenarios and fire area analyzed to Category II.
  - Multiple Spurious considerations is generally 2 spurious for Category II.
    - Also need to look at spurious operations for initiating events and operator actions.

Handout Reference 4

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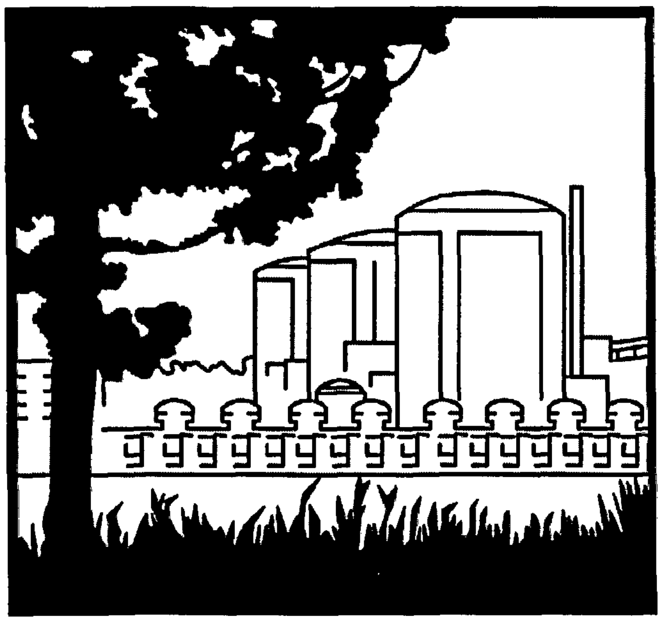
Duke Energy



Duke Power Non-Power Operations Transition

Oconee (ONS)

Harry Barrett
Liz Kleinsorg

March 28, 2006

Purpose

- Present General Overview of Non-Power Operational Modes Transition
- Discuss Methodology for establishing Non-Power Operational Modes Component List

Overall Non-Power Operational Mode Philosophy

- Consistent with industry guidance and the state of the art with respect to shutdown risk
  - Modify existing shutdown risk management structure to manage fire risk during high risk evolutions
  - Uses existing tools, training and experience to focus on those times when fire would have the highest impact on safety
  - NUMARC 91-06 already requires fire risk to be managed throughout the outage
  - Our current outage management process requires us to consider fire risk in the overall outage management process

Non-Power Operational Mode Methodology – NFPA-805

- NFPA-805 Nuclear Safety Goal:
  - "The nuclear safety goal is to provide <u>reasonable assurance</u> that a fire during any operational mode and plant configuration will not prevent the plant from achieving and maintaining the fuel in a safe and stable condition." (emphasis added)
- Reasonable Assurance is accomplished through the Management of Shutdown Risk during High Risk Evolutions (HREs)

Non-Power Operational Mode Methodology – NEI 04-02

- NEI 04-02, Section 4.3.3, "Non-Power Operational Modes Transition Review"
  - Based on maintaining Defense in Depth during low power and shutdown conditions
  - Builds on industry approaches to shutdown risk management
    - NEI 91-06
    - NUMARC 93-01

NEI 04-02 - continued

- NEI-04-02 – continued
  - Focus on managing fire risk <u>**Qualitatively**</u> during High Risk Evolutions (HREs)
  - NEI 91-06 defines High Risk Evolutions as follows:
    - Outage activities, plant configurations or conditions during shutdown where the plant is more susceptible to an event causing the loss of a key safety function.

NEI 04-02 - continued

- Detailed methodology provided in NEI 04-02, Appendix F:
  - Review existing plant outage processes to determine equipment relied upon to provide Key Safety Functions
  - Compare list of SSCs required to maintain KSFs with those analyzed for Safe Shutdown at Power

NEI 04-02 - continued

- NEI-04-02 – continued
  - For those SSCs not already credited, perform circuit/cable/routing analysis to determine where these SSCs can be impacted by fire
  - Identify locations where fire may impact shutdown safety
    - Pinch points where fire damage may prevent achieving KSFs
    - recovery actions credited for KSFs are performed
  - Identify fire areas where a single fire may damage all the credited paths for a KSF
    - May include fire modeling

NEI 04-02 - continued

- NEI-04-02 – continued
  - For those areas where investigation indicates a high risk, consider various options to reduce fire risk:
    - Prohibition or limitation of hot work in fire areas during periods of increased vulnerability
    - Verification of operable detection and /or suppression in the vulnerable areas.
    - Prohibition or limitation of combustible materials in fire areas during periods of increased vulnerability
    - Provision of additional fire patrols at periodic intervals or other appropriate compensatory measures (such as surveillance cameras) during increased vulnerability
    - Use of recovery actions to mitigate potential losses of key safety functions.
    - Identification and monitoring insitu ignition sources for “fire precursors” (e.g., equipment temperatures).

Non-Power Operational Mode Methodology – Duke

- NSD-403, "Shutdown Risk Management (Modes 4, 5, 6, and No-Mode) per 10 CFR 50.65 (a)(4)"
- Site Directive 1.3.5, "Shutdown Protection Plan"

Non-Power Operational Mode Methodology – Duke

- NSD-403, "Shutdown Risk Management (Modes 4, 5, 6, and No-Mode) per 10 CFR 50.65 (a)(4)"
  - Outage Risk Management
    - Outage plan includes detailed planning of HREs
      - Complex Evolution Plans
      - Critical Evolution Plans
    - Independent Review Team (IRT)
  - Defense in Depth Sheets
    - Spreadsheets that automatically indicate risk color based on Defense in Depth

Outage Risk Management - Duke

- Definition of Risk Thresholds
- Example Oconee Outage Summary Schedule
- Example Oconee Defense-in-Depth Sheet
- Example Oconee Configuration Sheet

Duke Energy. Outage Risk Management

- Pre-determined risk thresholds of shutdown risk are:

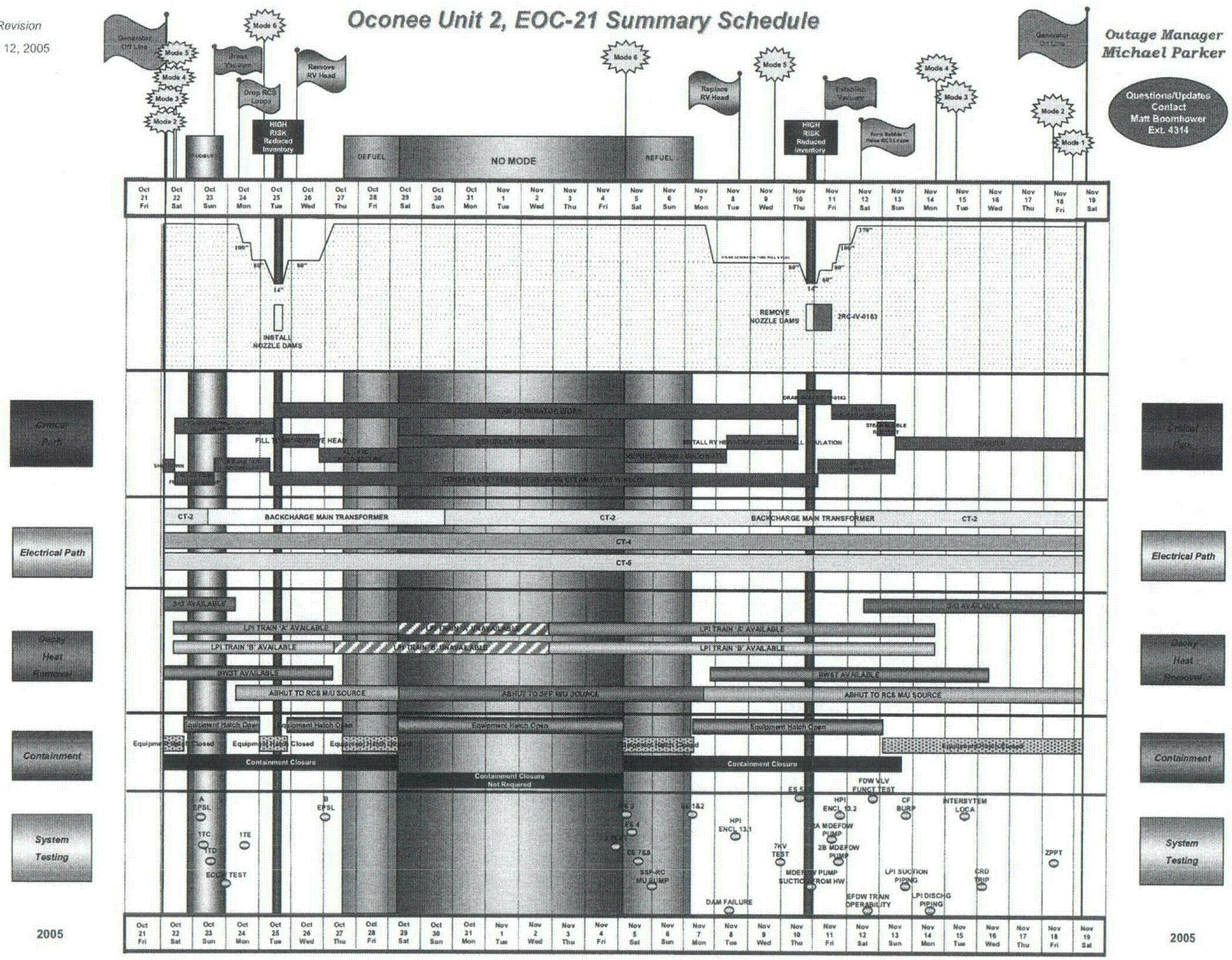
Color	Description
Green	The KEY SAFETY FUNCTION is at minimum risk.
Yellow.	The KEY SAFETY FUNCTION is in a reduced condition. The plant's ability to perform the associated safety function is reduced but still acceptable.
Orange	The KEY SAFETY FUNCTION is degraded and steps should be taken to minimize the amount of time in this condition. RISK MANAGEMENT PLAN is required prior to a planned entry. Planned entry is not allowed without PORC approval
RED	The KEY SAFETY FUNCTION is severely threatened. IMMEDIATE restoration is required. Planned entry is not allowed without PORC approval. Planned entry into a Red condition is not standard Duke practice and a Red condition is not normally entered voluntarily as noted in Appendix A.2.

Duke Energy Outage Risk Management

- Easy way to see High Risk Evolutions for each outage is to look at Summary Schedule
  - See attached 2EOC21 Summary Schedule

Example of Oconee Outage Summary Schedule

Final Revision
October 12, 2005



THIS IS NOT TO BE USED AS A SCHEDULE

Duke Energy. Defense in Depth Sheet

- Tool used to control Defense in Depth during outages is the Defense in Depth Sheets
- Tool provides a quick and easy method to determine shutdown risk status based on available components and systems and how they impact KSFs
- Used in conjunction with Plant Configuration Sheet

Oconee DID Sheet

Attachment 9.3B Defense In Depth Assessment Sheet

Preparer: ____________ Reviewer: ____________ Unit: ______
Mode: ____________ Date: ____________ Time: ______

KEY SAFETY FUNCTION AREAS	(√)	CREDIT CD	CREDIT BL	RED	ORANGE	YELLOW	GREEN	12 Hour Look Ahead CD	12 Hour Look Ahead BL
DECAY HEAT REMOVAL	(√)	CD	BL					CD	BL
				Core Damage					
One Decay Heat Removal Train Available		2	2	≤ 4	5	6 or 7	≥ 8		
Additional Decay Heat Removal Train Available		1	1						
Additional Decay Heat Removal Pump Available to Operable Train		1	0						
Low Decay Heat Condition		1	1						
Both S/Gs Available		1	1						
Both S/Gs Level >50% Operating Range & RCS Loops Filled		1	1						
Fuel Transfer Canal Flooded		3	2						
				Core Boil					
No Reduced Inventory		1	1	≤ 2	3	4 or 5	≥ 6		
At Least One Train HPI Available See Note 1		1	0						
Additional Train HPI Available See Note 1		1	0						
BWST Gravity Feed Available (RCS Vented) See Note 1		1	0						
RISK MANAGEMENT PLANS		Total						Total	
INVENTORY CONTROL	(√)	CD						CD	
				Core Damage					
At Least 2 LPI Pumps Available to At Least One LPI Train: See Note 1		2		≤ 3	4	5	≥ 6		
Three LPI Pumps Available to Two LPI Trains: See Note 1		1							
Additional Core Fill Flow Path Available: See Note 1		1							
Emergency Sump Available and NOT in Reduced Inventory		1							
Fuel Transfer Canal Flooded		4							
Not Draining to nor in Reduced Inventory Operation		1							
RISK MANAGEMENT PLANS		Total						Total	
REACTIVITY CONTROL	(√)	CD						CD	
				Core Damage					
RCS Boron Conc. ≥ Tech Spec Reqs Cold Shutdown/Refueling Boron Concen		3		≤ 5	6	7	≥ 8		
One Boration Flow Path Available		2							
One Additional Boration Flow Path Available		1							
At Least Two (2) Source Range NIs Operable		1							
Core Alteration NOT in Progress		1							
No High Risk Evolution		1							
No New Fuel in Core		1							
RISK MANAGEMENT PLANS		Total						Total	
CONTAINMENT CONTROL	(√)	Release						Release	
				Release					
Reactor Coolant System Intact		1		≤ 2	3	4	≥ 5		
Equipment Hatch Closed		1							
Containment Closure or Refueling Integrity Established as Req'd		1							
Core Alterations NOT in Progress		1							
Decay Heat, Inventory Control, Power Availability Functions NOT Red		1							
Decay Heat, Inventory Control, Power Availability Functions NOT Orange/Red		1							
Decay Heat, Inventory Control, Power Availability Functions NOT Yellow/Orange/Red		1							
RISK MANAGEMENT PLANS		Total						Total	
* * * ABOVE AREAS NOT APPLICABLE DURING "NO MODE" * * *									
SPENT FUEL POOL COOLING	(√)		BL						BL
				Spent Fuel Boil					
One Train Spent Fuel Pool Cooling Available			1	0	1	2	≥ 3		
Additional Train Spent Fuel Pool Cooling Available			1						
Third Train Spent Fuel Pool Cooling Available			1						
Reactor Core Defueling Has NOT Begun			1						
RISK MANAGEMENT PLANS		Total						Total	
POWER AVAILABILITY	(√)	CD	BL					CD	BL
				Core Damage					
One or Both 4160 V Main Feeder Bus(es) Energized from Offsite Source		2	2	≤ 5	6	7	≥ 8		
One Emergency Power Supply Available		1	1						
Additional Power Source Available and Both MFBs Energized		1	0						
Both MFBs Energized		1	1						
Both SGs Level >50% Operating Range & RCS Loops Filled		1	0						
No High Risk Evolution: See Note 2		2	1						
				Core Boil					
Fuel Transfer Canal Flooded: See Note 2		1	1	≤ 3	4	5	≥ 6		
No Safety Significant Switchyard Work in Progress		1	1						
Unit in No Mode		3	2						
Low Decay Heat Condition: See Note 2		1	1						
RISK MANAGEMENT PLANS		Total						Total	

Note 1: Can not credit while Fuel Transfer Canal Flooded
Note 2: Can not credit while in No Mode

Non-Power Operations Methodology – Duke

- Site Directive 1.3.5, "Shutdown Protection Plan"
  - Provides site specific guidance that implements NSD-403 at Oconee
  - Provides methodology for determining proper inputs to Defense in Depth Sheets
    - Plant Configuration Sheets
      - Determines Time to Boil
      - Time for Spent Fuel Pool to reach 210°F
      - Time to Close Equipment Hatch

Duke Energy

Oconee Plant Configuration Sheet

UNIT: ____ MODE: 5 6 NO MODE

Prepared by: ____________________ Date/Time: __________

Reviewed by: ____________________ Date/Time: __________

RCS Level: ______ in. As read on: __________

RCS Level Control Band: ______ in. (High) ______ in. (Low)

LPI Pumps Operable	A	B	C
LPI Coolers Operable	A	B	
SF Pumps Operable	A	B	C
SF Coolers Operable	A	B	C

SFP Level: ______ ft.

Level Control Band: ______ ft. to ______ ft.

FTC Flooded	YES	NO
Fuel in Reactor Vessel	YES	NO

Operable CETCs: ALL NONE SOME List: ______________

Time To Core Boil ______________ Minutes

If Time To Core Boil is ≤16 min, ensure equipment hatch closed.

If Time To Core Boil is <30 min, ensure SPOC is manning equip. hatch (if open)

RCS Makeup Paths

1. BHUT → HP-363 → A / B LPI A BHUT __________ GAL.
2. BWST → A / B LPI (Forced / Gravity) BWST __________ GAL.
3. BWST / BHUT → HPI CBAST __________ GAL.
4.

RCS Boron: __________ (Actual) __________ (Required)

Canal Seal Plate	ON	OFF
Transfer Tube Covers	ON	OFF

OFFSITE POWER SOURCES

CT-1 / CT-2 / CT-3

BACKCHARGED MAIN TRANSFORMER

CT-5 (From Central Switchyard)

EMERGENCY POWER SOURCES

CT-1 / CT-2 / CT-3

CT-4

CT-5 (From Lee Combustion Turbine via isolated power path)

RCS Temperature: ______ °F As read on: ________

RCS Temperature Band: ______ °F (High) ______ °F (Low)

LPSW Pumps Operable	A	B	C

LPSW Suction From Unit ______ CCW

RCW Pumps Available	A	B	C	D
RCW Coolers Available	A	B	C	D

SFP Temperature ______ °F

Time For SFP Temperature to Reach 210 °F: ______ hours

Reactor Vessel Head	OFF	ON
LP-19 Flange Installed	YES	NO
LP-20 Flange Installed	YES	NO
Reactor Building Purge is:	OFF	ON
Equipment Hatch is:	CLOSED	OPEN
SPOC is manning Equip. Hatch	YES	NO

	A OTSG		B OTSG	
Upper Primary Handholes	ON	OFF	ON	OFF
OTSG Nozzle Dam Installed	YES	NO	YES	NO

Cold Legs Are:	DRAINED	NOT DRAINED
SF-1	OPEN	CLOSED
SF-2	OPEN	CLOSED

Main Feeder Bus #1 Energized	YES	NO
Main Feeder Bus #2 Energized	YES	NO
RC-66 Installed on PZR	YES	NO
RC-67 Installed on PZR	YES	NO
RC-68 Installed on PZR	YES	NO

NOTES: ____

Non-Power Operations Methodology – Duke

- Site Directive 1.3.5, "Shutdown Protection Plan" - continued
  - High Risk Evolutions require use of Risk Management Plans
    - Approved compensatory actions designed to:
      - Maintain Defense in Depth by alternate means
      - Restore Defense in Depth when system availability decreases below the planned Defense in Depth
      - Minimize the likelihood of a loss of KSF during HRE

Non-Power Operations Methodology – Duke

- Site Directive 1.3.5, "Shutdown Protection Plan" - continued
  - Risk Management Plans are required:
    - When a planned activity puts KSF in "Orange" or "Red"
    - During any defined HRE
    - Any time an opening of >1.25 inches exists in Aux Bldg piping (CCW, LPSW, HPSW)
    - Any time Main Feeder Bus is removed from service
    - Any time unplanned entry into "Orange" > 8 hours or "Red" > 1 hour

Non-Power Operations Methodology – Duke

- Site Directive 1.3.5 continued
  - Risk Management Plans will include one or more actions to reduce fire risk during these evolutions
    - Prohibition or limitation of hot work in choke point areas
    - Verification of operable detection and /or suppression in the vulnerable areas.
    - Prohibition or limitation of combustible materials in pinch point areas
    - Provision of additional fire patrols at periodic intervals or other appropriate compensatory measures (such as surveillance cameras)
    - Use of recovery actions to mitigate potential losses of key safety functions.
    - Identification and monitoring insitu ignition sources for "fire precursors" (e.g., equipment temperatures)

Non-Power Operations Methodology – Duke

- Site Directive 1.3.5 continued
  - It is important to note that no one of these should be considered "permanent" or "required" in a normal sense of the word
  - It is unlikely that we would have an outage or a HRE that would require <u>all</u> of these items
  - Outages are unique; no two outages are alike; management of fire risk will have to be tailored for each outage based on planned work, equipment taken out of service, schedule, etc.
  - What works for one outage may not be effective for the next outage.

Non-Power Operational Component Selection

- Reviewed NSD 403
  - Listed KSFs for Oconee:
    - DECAY HEAT REMOVAL
    - INVENTORY CONTROL
    - REACTIVITY CONTROL
    - CONTAINMENT CONTROL
    - SPENT FUEL POOL COOLING
    - POWER AVAILABILITY
  - For each KSF, identified systems/components 'utilized' during High Risk Evolutions

Non-Power Operational Component Selection

- Reviewed Operations Procedures
  - Normal Operating Procedures
    - Low Pressure Injection System
    - Draining and Nitrogen Purging RCS
    - Filling and Venting RCS
    - Quench Tank Operations
  - Abnormal Procedures
    - Loss of Decay Heat Removal
  - Emergency Procedures
    - EP/X/A/1800/001, Enclosure 5.38

Non-Power Operational Component Selection

- Components used to implement these procedures were then compared to the Safe Shutdown Equipment List (SSEL) to determine if the component had been previously analyzed
- Review included comparison of component position required for Hot Standby and Cold Shutdown from SSEL to the position required for outage tasks

Non-Power Operational Component Selection

- Examples of Components which may require 'routing information':
  - Reactor Coolant System Level instruments used during shutdown (LT-5 and associated indicators)
  - Containment Purge Valves (PR-1, 2, 3 & 4)
  - Coolant Storage Pumps and Valves
    - Bleed Holdup Tanks
    - Bleed Transfer Pumps
  - Borated Water Storage Tank Level instruments

Non-Power Operational Mode Component Selection

- Examples of Components which will not require 'routing information':

  - Spent Fuel Pool Cooling

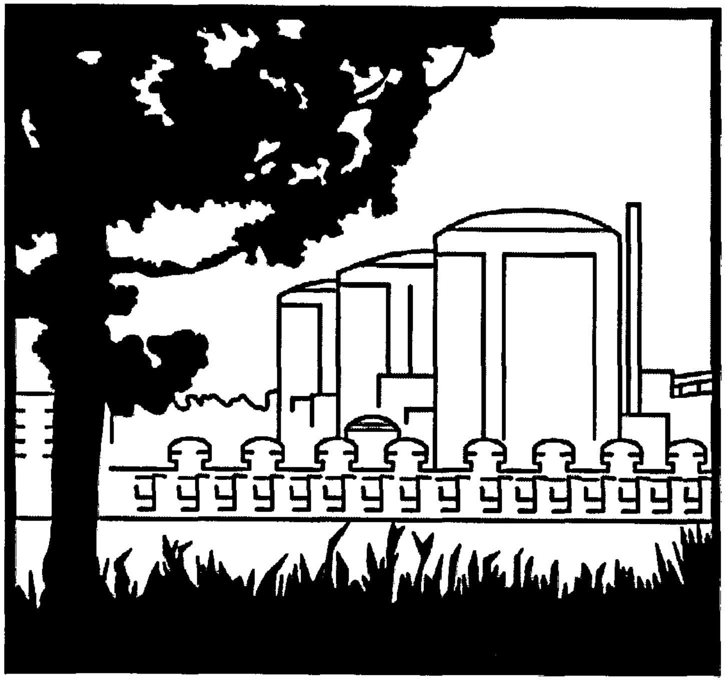
  - Containment Closure

Summary

- Non-Power Operation Transition methodology will dovetail with existing shutdown risk management process
- Approach focuses on managing fire risk during High Risk Evolutions in order to protect the ability to achieve the Key Safety functions required to keep the fuel in a safe and stable condition
- Fire risk may be addressed through a variety of methods, which may change from outage to outage and time in outage based on things that affect fire risk (work planned, equipment available, potential fire impact, etc.)

Handout Reference 5

NFPA 805 Pilot Observation Visit
Trip Report - ML061500468
March, 2006



Duke Power Multiple Spurious Operations (MSO) Expert Panel

Oconee (ONS)

Harry Barrett
Dennis Henneke

March 28, 2006

Purpose

- Present General Overview of the Oconee Multiple Spurious Operations (MSO) Expert Panel
- Discuss lessons learned from Expert Panel

MSO Expert Panel

- Expert Panel review for new Multiple Spurious Operations (MSO):
  - Uses NEI 00-01 Appendix F methodology
  - Takes into consideration issues/scenarios from NEI 04-06 Draft Rev. L
- Expert Panel met once to test the method:
  - Identified a combination of concern involving failure of injection and cooling to 1 RCP.

MSO Expert Panel

- Expert Panel Makeup
  - Site Fire Protection Engineer
  - 3-Site Fire Protection Engineering Lead
  - Appendix R Engineers (all three sites)
  - Operations (SRO licensed)
  - PRA Engineer
  - Consultant experienced at other stations
  - System Engineering
  - Electrical Engineering
  - Component Engineering (Valves)

Duke Energy

Methodology

- List Safe Shutdown Functions
- For these Safe Shutdown Functions, identify possible failure mechanisms
- Using various tools, identify potential component combinations that could defeat safe shutdown through the previously identified failure mechanisms
  - Oconee Flow Diagrams (P&IDs)
  - Safe Shutdown Logic Diagrams
  - PRA Fault Tree Logic
- Build these combinations into fire scenarios to be investigated

Safe Shutdown Functions (SSDFs)

- Reactivity Control
- Decay Heat Removal
- Reactor Coolant System
  - Inventory Control
  - Pressure Control
- Process Monitoring
- Support Functions

SSDF
Failure Mechanisms

- Loss of RCS Inventory
- Excessive RCS Injection
- Loss of RCS Pressure Control
- RCS Overcooling
- Loss of SG Cooling
- Loss of Reactivity Control

SSDF
Failure Scenarios

- Loss of RCS Inventory
  - RCP Seal LOCA
  - Stuck Open Pressurizer Safety Valve
  - Spurious Opening of Head/High Point Vents
  - Failure of RCMUP due to RB Flooding
  - Spurious Opening of Letdown Line
  - Total Loss of Electrical Power
- Excessive RCS Injection
  - Spurious HPI injection beyond SSF Letdown with failure of Pzr Safety Valve open

SSD Failure Scenarios - continued

- Loss of RCS Pressure Control
  - Spurious Aux Pressurizer Spray
  - Spurious Pressurizer Heater Actuation
  - Spurious start of RCP with subsequent pump heat
  - Spurious start of RCP with spurious Normal Pressurizer Spray
- RCS Overcooling
  - Excessive feedwater flow
    - Spurious EFW actuation with spurious EFW Control Valve opening
    - Failure to trip/isolate Main FDW/Hotwell/Booster Pumps
  - Excessive steam flow
    - Spurious Turbine Bypass Valve actuation
    - Failure to isolate SSRH with loss of IA

SSD Failure Scenarios - continued

- Loss of SG Cooling
  - Spurious isolation of ASW/FDW flow path
  - Loss of Electrical Power
- Loss of Reactivity Control
  - Boron Dilution

Oconee Issues Identified Prior to Expert Panel

- 1,2,3LP-19/20 spurious opening flooding out RCMUP (Single hot short)
- Single spurious start of HPI C pump resulting in full HPI injection through normally open injection valve
- Single spurious full HPI injection through normally closed HPI injection valve
- Spurious actuation of ES channel 7 or 8 resulting in RB Spray Actuation resulting in flooding out RCMUP (two hot shorts)
- Spurious ES channel 1 or 2 actuation resulting in full HPI injection after transferring control to SSF (two shorts to ground)
- Spurious EFW actuation after transferring control to SSF (multiple shorts/hot shorts)
- Spurious opening of both Reactor Head Vent and Reactor Head Vent block valve and/or Reactor High Point Vent and associated block valves (two hot shorts in same wireway inside Main Control Board)
- Failure to trip/isolate Main FDW with spurious opening of Main Feed Regulating Valve
- SSF MOVs could be damaged by Turbine Building Fire prior to transfer

Lessons Learned in Expert Panel

- Knowledge of current Operating Experience ensures more complete coverage of issues
  - Loss of cooling water to Letdown Heat Exchangers could cause loss of all operating HPI pumps due to low NPSH
  - Exposure fire may impact instrumentation tubing inside Reactor Building
  - Potential fire impacts on Nuclear Instruments (NIs) in redundant shutdown areas (Reactor Building and West Penetration Room)

Lessons Learned in Expert Panel - continued

- Expert Panel generated numerous action items for further investigation
  - Level of detail in existing procedures
  - Investigate if RCP restart could cause seal failure
  - Determine if RCMUP can keep up with all pressurizer heaters in service
  - Determine impact of ICS Override of Feedwater Control when RCS pressure exceeds 2200 psig
  - Determine failure mode of coolant makeup valves
  - Determine reactivity addition rate of deborating demin
  - Determine assumptions related to SSF Submersible Pump timing
  - Verify SSF electrical system separation from Unit 2
  - Verify NI cables do not run through West Penetration Room
  - PRA Group to roll expert panel results into Fire PRA

Summary

- Duke has successfully completed the MSO Expert Panel for Oconee
- Process was successful in identifying numerous scenarios for further study
- Process also identified numerous action items requiring further investigation

Handout Reference 6

NFPA 805 Pilot Observation Visit
Trip Report - ML061500468
March, 2006

DISCUSSION OF THERMAL-HYDRAULIC ANALYSES

JILL C. WATSON

NGG Nuclear Generation Group

Progress Energy

Thermal-Hydraulic Analyses

- What it is ? How it is used ?
- Nuclear Safety Performance Criteria
- Tools to be used

What is it? How is it used?

- Purpose
  - Estimate plant behavior and response to fire events
- Method
  - Bounding approach to optimize effort using input from loss profile and timing of fire event
- Uses
  - Input to determining the acceptability of meeting the nuclear safety performance criteria
  - Input to determining acceptability of recovery actions

Nuclear Safety Performance Criteria

- NFPA 805 Section 1.5.1

"Fire protection features shall be capable of providing reasonable assurance that, in the event of a fire, the plant is not placed in an unrecoverable condition. To demonstrate this, the following performance criteria shall be met.

- *Reactivity Control. Reactivity control shall be capable of inserting negative reactivity to achieve and maintain subcritical conditions. Negative reactivity inserting shall occur rapidly enough such that fuel design limits are not exceeded.*
- *Inventory and Pressure Control. With fuel in the reactor vessel, head on and tensioned, inventory and pressure control shall be capable of controlling coolant level such that subcooling is maintained for a PWR and shall be capable of maintaining or rapidly restoring reactor water level above top of active fuel for a BWR such that fuel clad damage as a result of a fire is prevented.*
- *Decay Heat Removal. Decay heat removal shall be capable of removing sufficient heat from the reactor core or spent fuel such that fuel is maintained in a safe and stable condition.*
- *Vital Auxiliaries. Vital auxiliaries shall be capable of providing the necessary auxiliary support equipment and systems to assure that the systems required under a), b), c), and e) are capable of performing their required nuclear safety function.*
- *Process Monitoring. Process monitoring shall be capable of providing the necessary indication to assure the criteria addressed in a) through d) have been achieved and are being maintained."*

PRA Acceptance Criteria

- Supports additional success path such as feed and bleed cooling (as long as not sole protected method)
- Allows RCP Seal LOCA without core damage being assumed
- Increases time window for operator response and allows for probability that operator actions will fail
- Acceptability based on NEI 04-02 and Regulatory Guide 1.205
- Uses CDF and LERF as Figures of Merit

Nuclear Safety Performance Criteria

- Temporary deviations allowed as long as "fuel damage as a result of the fire is prevented."
  - Consistent with RI-PB approach
  - Consistent with Reasonable Assurance that the plant is not placed in an 'unrecoverable condition' [NFPA 805 1.5.1]
  - PB approach to establish performance and results that a "...failure to meet a performance criteria, while undesirable, will not in and of itself constitute or result in an immediate safety concern." [NFPA 805 1.6.45]

Tools

- Analytical Tools
  - Gothic
  - MAAP
  - NSSS Best Estimate Codes

Handout Reference 7

NFPA 805 Pilot Observation Visit
Trip Report - ML061500468
March, 2006

PE DEVELOPMENT AND DISCUSSION FOR HFEs IN THE FIRE PSA

ROBERT RISHEL

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Progress Energy

Extension of Existing Human Reliability Analysis for Fire Scenerios

- Based upon discussion in CR 6850 Chapter 12
- HRA tool is based upon existing PSA HRA methodology;
  - Time based Human Cognitive Reliability with Operator Reliability Experiments (HCR/ORE)
  - Caused Based method using Performance Shaping Factors with decision trees that could affect operator response
  - Execution phase using Techniques for Human Error Rate Prediction (THERP)

Potential HFEs Interactions

- Different context or timing for a particular operator response during a fire than during the internal events PSA
- New HFEs that are specifically required by the fire procedure (e.g. pre-emptive actions)
- Logic models may require consideration of HFEs and other human actions not previously considered
- Effects of fire may result in unintended actions by the operating staff

Fire HRA Considerations

- As discussed in CR 6850 there are many inputs to evaluate
  - Number of operators available may change due to the fire
  - Location of operator actions outside the control room compared to fire and smoke interaction
  - Change in time available or response time
  - Fire impact on Control Room indications
    - May need to trace circuits beyond SSA circuits

HRA Screening

- Same as in CR 6850
  - Screening values used to determine need for further analysis.
  - Detailed analysis is likely to be a lot more effort than the internal events HRA and thus need to limit the effort.

HRA and Instrumentation

- Need to considered fire induced instrument failures
  - Considered for in mal-operations
  - Identify redundant instruments
  - Procedure guidance on instrumentation to be used

Local Actions – Considerations Detailed Analysis

- Local actions would be credited only if:
  - Input from Operators that the local action would be attempted based on fire procedures
  - Fire would allow access to equipment
  - Equipment itself would not be involved with fire or suppression measures
  - Adequate time to put on the SCBA and any other protective gear and still complete action within allowed time.
  - Amount if any obscured vision due to smoke
- Delay in execution of local actions due to slower communication
- Impact on error recovery due to fire distractions

Need to Adjust Time Impact due to Fire

- For Control Room Fire that does not result in abandonment
  - Consider using a two point analysis, for example:
    - Ten minute fire
    - Twenty minute fire
  - After Fire suppressed – Add time to the response time to reflect residual distractions
  - Scenarios where some control room indications are known to be lost could increase response time to allow time to determination of correct indications
  - Scenarios where all control room indications lost would typically fail the action without specific additional information.

Adjust Cause Based Factors

- Performance Shaping Factors the could affect response for example: (others PSFs may be applicable)
  - Data not available ($p_c a$)
  - Data not attended to ($p_c b$)
  - Data misread or miscommunicated ($p_c c$)
  - Information misleading ($p_c d$)
  - Procedure step skipped ($p_c e$)
  - Stressor would also be applied as applicable

Additional Considerations to Assess Execution Actions

- Fewer operators to support local actions
  - Could also make multiple actions completely dependent
  - Reduce review of execution actions
- Loss of STA or other extra control room staff
- Strongly encouraged to observe an fire simulator scenarios, walk-thru, or talk-through to understand crew dynamics, use of peer checks etc.

Handout Reference 8

NFPA 805 Pilot Observation Visit
Trip Report - ML061500468
March, 2006

NFPA 805 Transition
Chapter 3 - Manual Firefighting

Alan Holder, CES
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March 29, 2006

NGG Nuclear Generation Group

Progress Energy

PE Manual Firefighting / Fire Brigade Initiatives

- Establish common Fire Brigade Training Programs across PE fleet supporting NFPA-805 Transition
- Gap Analysis of applicable standards
  - NFPA-805, Performance Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants
  - NFPA-600, Standard on Industrial Fire Brigades
  - NFPA-1500, Standard on Fire Department Occupational Safety and Health Program
  - NFPA-1403, Standard on Live Fire Training Evolutions
- Review of Pre-Fire Plans, Engineering Controls and Fire Brigade Training Materials to ensure specific identification of containment and monitoring of contaminated fire suppression water.

PE Manual Firefighting / Fire Brigade Initiatives

Table G-1 NFPA 805 – Radioactive Release Transition Review Guidance		
NFPA 805 Requirements	**Implementing Guidance**	**Results (Example)**
Radiation release to any unrestricted area due to the direct effects of fire suppression activities (but not involving fuel damage) shall be as low as reasonably achievable and shall not exceed applicable 10 *CFR*, Part 20, Limits.	**Review pre-fire plans.** Ensure for locations that have the potential for contamination that specific steps are included for containment and monitoring of potentially contaminated fire suppression water. Update pre-fire plans as necessary.	Review of Pre-Fire Plans is underway to determine adequacy of guidance for containment and monitoring of potentially contaminated fire suppression water (run-off) for applicable plant areas. Review results to be provided to site FP PM for inclusion in Pre-Fire Plans.
	Review fire brigade training materials. Ensure that training materials deal specifically with the containment and monitoring of potentially contaminated fire suppression water. Update training materials as necessary.	A systematic review of fire brigade training materials is underway within NGG Fire Protection Training PEER Group. A focused approach to fire brigade training has aligned the current fire brigade training schedule as well as the NFPA-805 transition process utilizing a rolling wave method beginning with the HNP and providing lesson learned for incorporation at all PE sites.

PE Manual Firefighting / Fire Brigade Initiatives

	1403	600	805	1081
Ventilation	X			
Overhaul	X			
Fire Behavior	X			
Fire Safety	X			
PPE	X			
Fire Extinguishers	X			
Fire Detection				X
Fire Suppression Systems				X
ICS		X		
Hose, Nozzles & Appliances	X			
Water Supply	X			
Forcible Entry	X			
Search and Rescue				X
Ladders	X			
Radiological			X	
Offsite				

PE Manual Firefighting / Fire Brigade Initiatives

- NFPA 1403 Lesson Plan Topics Review Schedule
  - 3/06 Portable Extinguishers
  - 4/06 Fire Hose, Appliances, Streams & Foam
  - 5/06 Safety
  - 6/06 Ladders
  - 7/06 Ventilation
  - 8/06 Fire Behavior
  - 9/06 PPE
  - 10/06 Forcible Entry
  - 11/06 Overhaul
  - 12/06 Water Supply

PE Manual Firefighting / Fire Brigade Initiatives

- 1/Q ‘06, Fire Pre-Plans & Fire Extinguishers
- 2/Q ’06, Fire Detection & Foam
- 3/Q ’06, Fire Fighting Strategy & Tactics
- 4/Q ’06, Interior Fire Attack, Annual Practice
- 1/Q ’07, Chemistry & Physics of Combustion
- 2/Q ’07, Personal Protective Equipment, Search & Rescue, Annual Practice
- 3/Q ’07, Fire Protection Systems
- 4/Q ’07, Flammable/Combustible Liquids & Gases, Transformer Fires

PE Manual Firefighting / Fire Brigade Initiatives

- What "Success" Looks Like
  - Element of "*Rolling Wave*" project, includes all four sites, supports HNP as pilot, with lessons learned applied to other sites.
  - Brigade Training Program topical revisions coincide with HNP training schedule and incorporate radiological release containment and monitoring.
  - End product is an up-to-date, NFPA compliant, fleet-wide program, which meets our training needs and regulatory requirements.

Handout Reference 9

NFPA 805 Pilot Observation Visit
Trip Report - ML061500468
March, 2006

NFPA 805 NRC Pilot Observation Meeting
NFP-805 Product Quality

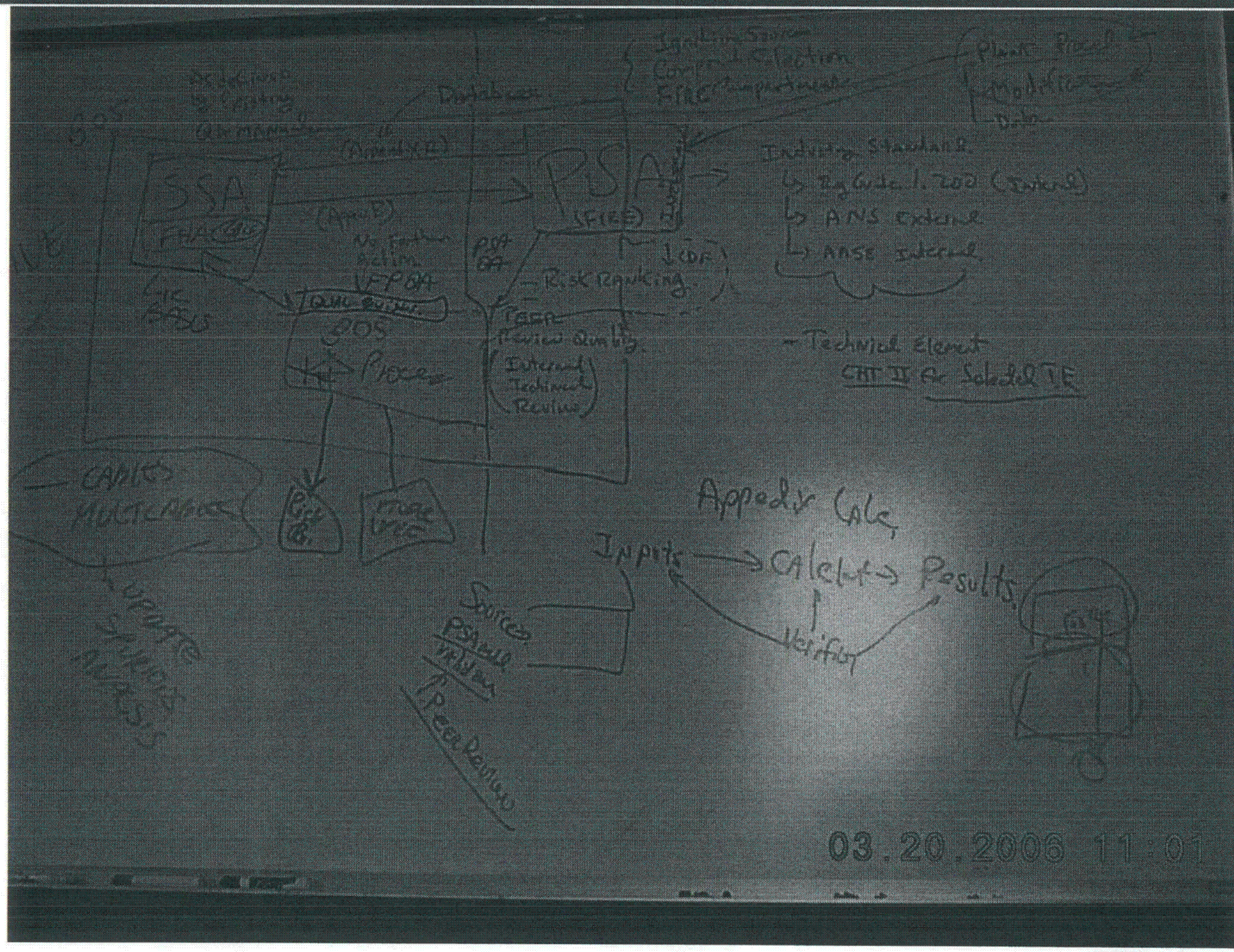
David Miskiewicz, CES

March 29, 2006

NGG Nuclear Generation Group

Progress Energy

First try



Database
SSA
FHA
PSA
(FIRE)
Industry Standard
ANS External
ANSI Internal
Risk Ranking
Technical Element
Appendix Calc
Inputs → Calc → Results
Verify
Sources
Peer Review
UPDATE
03.20.2006 11:01

Product Quality – Topics for Discussion

- SSA / FHA
- Internal Events PRA
- Fire PRA
- Product Forms
- Software

SSA / FHA

- Approved controls will be maintained consistent with existing requirements for Fire Protection products
  - Circuit Analysis
  - Fire Modeling
  - Thermal Hydraulic Analysis
  - Fault-Tree Analysis for SSA
  - Database

Internal Events PRA

- **Method 1:** Perform full assessment against the ASME Standard (an NEI GAP assessment can be used)
  - Identify SRs which do not meet Category II and evaluate need to update PRA based on the application(s) to be implemented ("B" level F&Os)
- **Method 2:** Determine those areas which should meet ASME Capability Category II for the application desired
  - Perform assessment of those SRs only and update PRA accordingly

Internal Events PRA (cont.)

- A peer review should be obtained for significant upgrades
- Can be completed in parallel with development of Fire PRA information

Fire PRA

- Follow NUREG/CR-6850 Guidance
- Assessment/Peer review to ANS (Fire PRA) Standard will be needed eventually
- Data supporting the Fire PRA can be developed using the same methods as those supporting the internal events PRA
- Data which is also directly input to the SSA should be developed to SSA standards
  - Identification of ignition sources
  - Component selection
  - Circuit routing

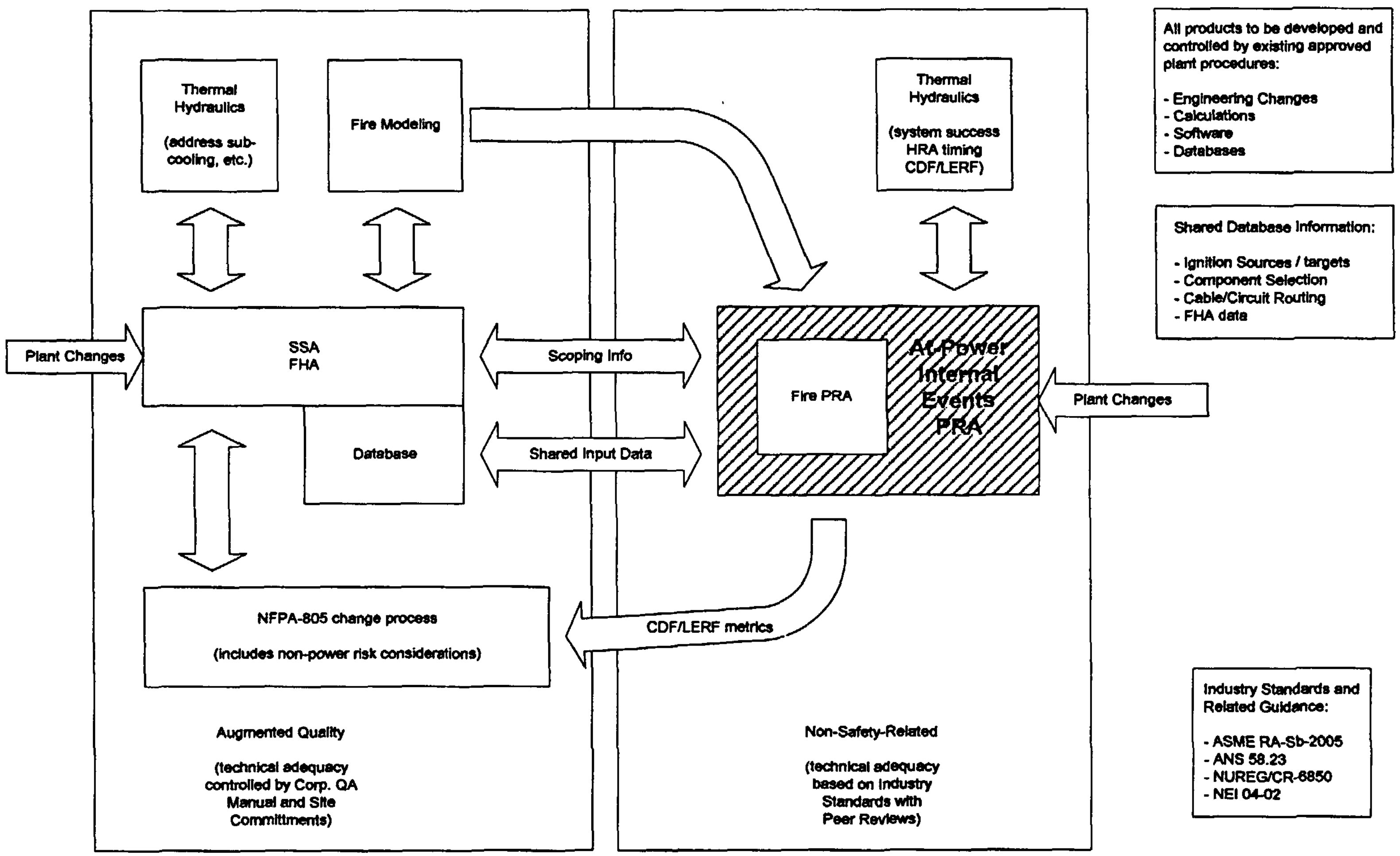
PRA Products

- PRA analyses and results are not committed to Fire Protection standards even though they can be used to support SSA and NFPA-805 changes
  - Calculations
  - Engineering Changes
  - Software
- PRA product documentation is controlled using approved procedures that support the requirements of the applications

Software / Databases

- Software and Databases that primarily support the SSA will be qualified for Fire Protection Program use
  - CAFTA
  - Fire Modeling
  - FSSPM (Database)
- Software and Databases that primarily support PRA analysis only will be qualified for PSA use
  - R&R Workstation Tools
    (includes CAFTA features not used for SSA)
  - T-H (success criteria, HRA timing)
  - PRA models

Second Try


Thermal Hydraulics
(address sub-cooling, etc.)
Fire Modeling
Thermal Hydraulics
(system success HRA timing CDF/LERF)
All products to be developed and controlled by existing approved plant procedures:
- Engineering Changes
- Calculations
- Software
- Databases
Shared Database Information:
- Ignition Sources / targets
- Component Selection
- Cable/Circuit Routing
- FHA data
Plant Changes
SSA
FHA
Scoping Info
Fire PRA
At-Power Internal Events PRA
Plant Changes
Database
Shared Input Data
NFPA-805 change process
(includes non-power risk considerations)
CDF/LERF metrics
Augmented Quality
(technical adequacy controlled by Corp. QA Manual and Site Committments)
Non-Safety-Related
(technical adequacy based on industry Standards with Peer Reviews)
Industry Standards and Related Guidance:
- ASME RA-Sb-2005
- ANS 58.23
- NUREG/CR-6850
- NEI 04-02

Handout Reference 10

NFPA 805 Pilot Observation Visit
Trip Report - ML061500468
March, 2006

NFPA 805 NRC Pilot Observation Meeting
Change Process

Jeff Ertman, CES
Harry Barrett, Duke Power
Liz Kleinsorg, KGRS
March 29, 2006

Duke Energy SM

Progress Energy

Change Process – Topics for Discussion

- Regulatory Guide 1.205 Issues Related to Change Analysis
- NEI 04-02 Revision 2 Proposed Revisions Related to Change Analysis
- Future considerations for LAR for NFPA 805 Chapter 3 Items
- Change Analysis Examples
- NEI 04-02 Updates envisioned

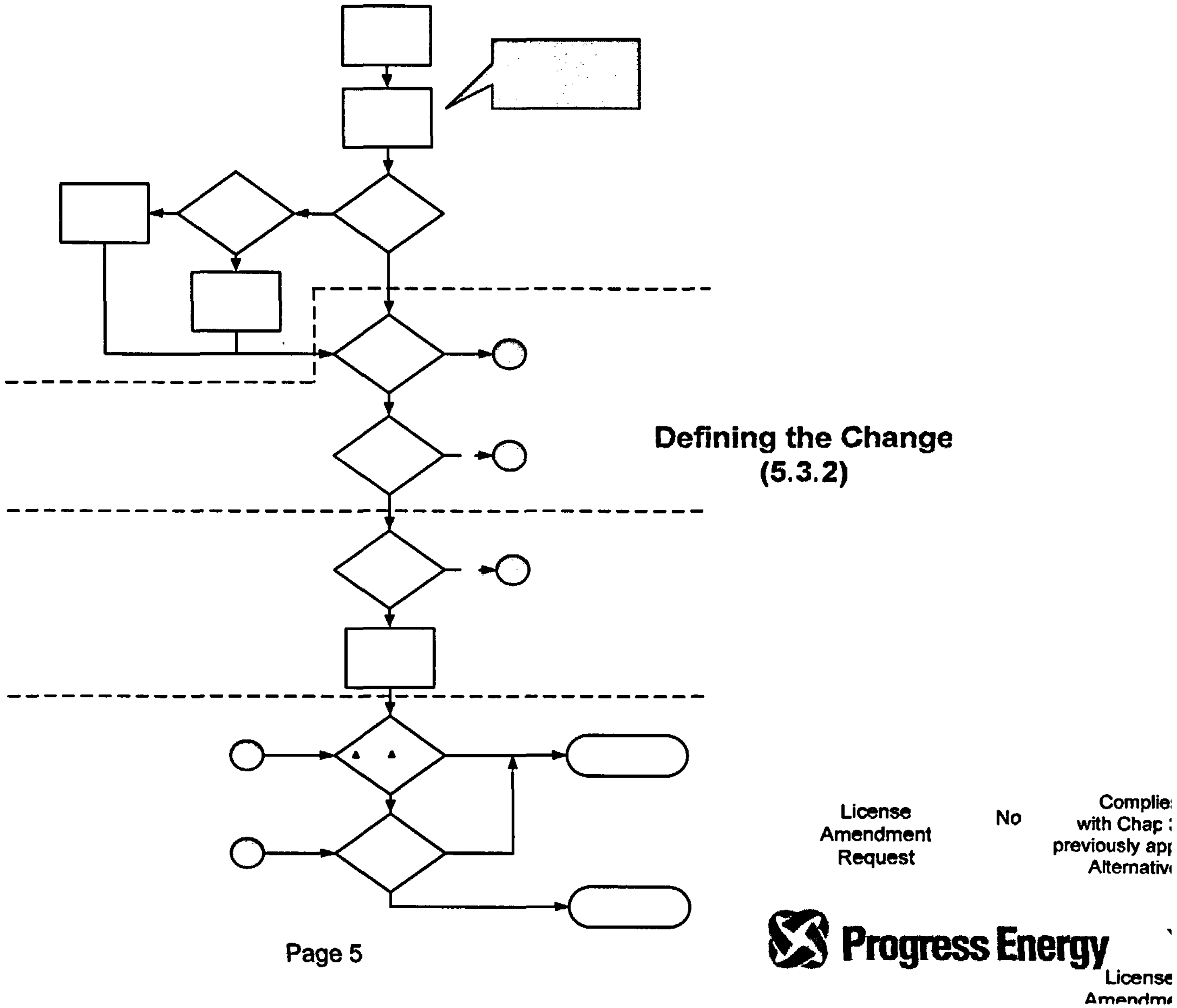
Regulatory Guide 1.205 Issues Related to Change Analysis

- License Condition Prior Approval Thresholds
- 90-day NRC Approval 'Process'
- Circuit Analysis (RG 1.205 Section 3.3 vs. NEI 04-02)
- Cumulative Risk of Changes
- Related vs. Unrelated Changes

NEI 04-02 Revision 2 Proposed Revisions Related to Change Analysis

- Nuclear Safety & Radioactive Release now Precede Fundamental Element / Minimum Design Requirements on Sample Form
- Emphasized Relationship between NFPA 805 Chapter 4 Requirements and Chapter 3
- Changed Screening to "Potentially" Greater than Minimal
- Added Provision for Risk Decreases

NEI 04-02 Revision 2 Proposed Revisions Related to Change Analysis (Figure 5-1)



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NEI 04-02 Revision 2 Proposed Revisions (Appendix I)

Page 1 of ___

LICENSEE NAME			UNIT(S)		
☐ SITE A	☐ SITE B	☐ SITE C	☐ Unit 1	☐ Unit 2	☐ Unit 3

ACTIVITY TITLE/DOCUMENT/REVISION ______________________

Complete each section and summarize results below.

CONCLUSIONS

CHANGE EVALUATION SUMMARY	RISK EVALUATION SUMMARY
☐ The change is editorial or trivial in nature. (Screening per Section 1.a, 2.a, or 3.a)	☐ The change can be evaluated using a PRELIMINARY RISK SCREEN (Section 4) ☐ Yes ☐ No
☐ The change affects compliance with the Nuclear Safety Criteria of NFPA 805 as defined in [insert reference to the appropriate document] (Section 1). ☐ Yes ☐ No	☐ The RISK EVALUATION demonstrates that Δ CDF/LERF are acceptable and defense-in-depth / safety margin are maintained. Therefore, the change is acceptable.
☐ The change affects compliance with the Radioactive Release Criteria of NFPA 805 as defined in [insert reference to the appropriate document] (Section 2). ☐ Yes ☐ No	☐ The RISK EVALUATION demonstrates that either the Δ CDF/LERF are unacceptable and/or defense-in-depth / safety margin are not maintained. Therefore, the change is NOT acceptable.
☐ The change affects compliance with a required Fundamental Elements / Minimum Design Requirements of NFPA 805 Chapter 3 (Section 3). License Amendment Required? ☐ Yes ☐ No	

SIGNOFFS

Print Name ____________ Signature ____________ DATE ________
SCREEN PREPARER[1]

Print Name ____________ Signature ____________ DATE ________
SCREEN REVIEWER

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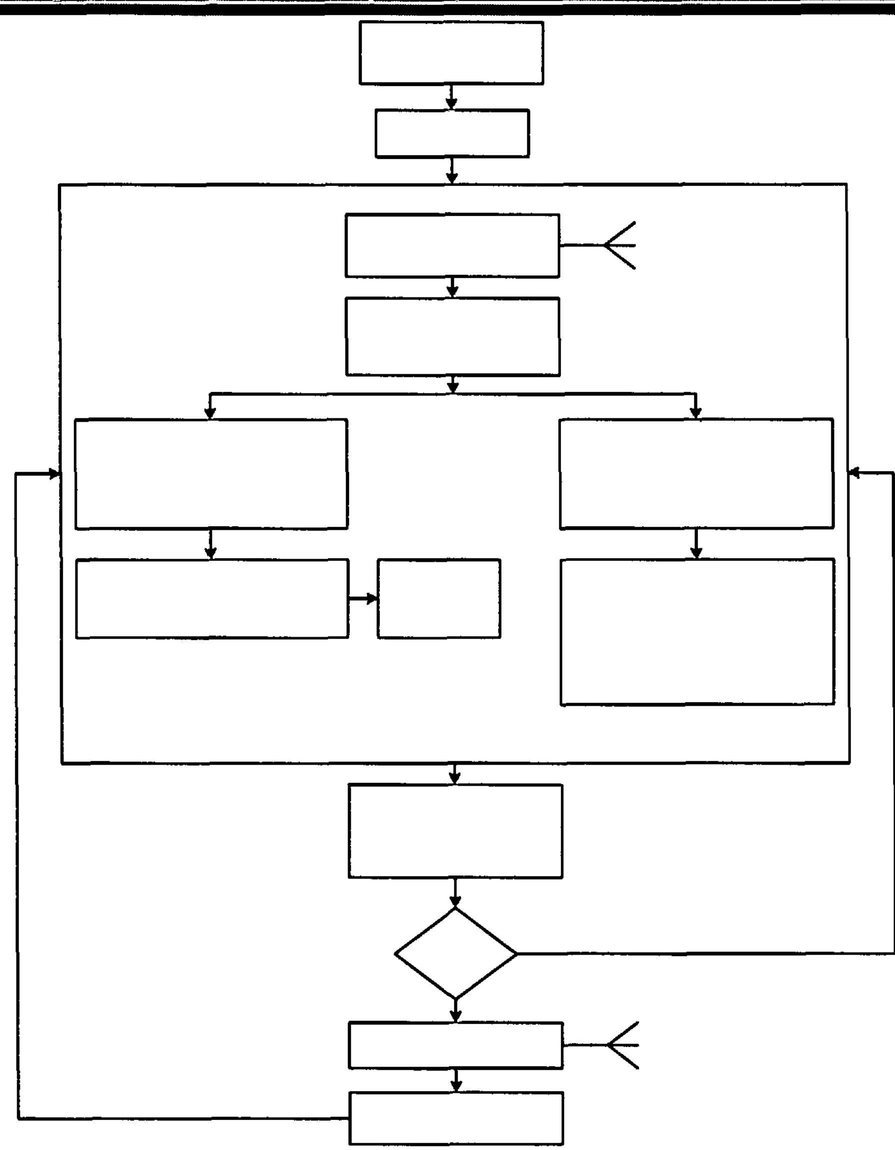
Engineering Evaluation History

- GL 86-10 clarified need for prior NRC approval of engineering evaluations
- Primary Applications are: Fire Barriers, Code Evaluations, and Coverage
- Regulatory Guide 1.189 re-iterated acceptability of these types of engineering evaluations
- NFPA 805 recognized past and future use of these types of engineering evaluations (Figure 2-2 and 2.2.7)

Figure 2.2 of NFPA 805



Es

Identif

NFPA 805 Section 2.2(c)

Evaluate compliance to performance criteria

Ident
comp
area

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NFPA 805 Chapter 3
Alternate Methodology LAR

- NFPA 805 does not allow performance based option
- 10 CFR 50.48(c) allows for use of RI-PB methods for Chapter 3 and alternatives with a LAR
- Planned development of alternate methodology to allow:
  - Transition of existing engineering evaluations without submitting LAR
  - Performance of evaluations post-transition without LAR

Alternate Methodology

- Alternate Methodology to include:
  - Scope and limitations
  - Methodology
  - Acceptance Criteria
- Alternate Methodology will be included in NEI 04-02
  - Endorsed by NRC
  - Referenced by Licensees in LAR submittal

Change Analysis Examples

1. Security conduit in a fire door
2. Install a transfer switch for a pump power supply
3. Change to Thermal Hydraulic supporting calculation
4. Fire Brigade training change
5. QA program change

Example 1 - Security Conduit in a Fire Door

- If fire barrier is required, then NFPA 805 Chapter 3 Requirements in effect
- May not meet NFPA 80 Requirements
- Prior code compliance evaluation or GL 86-10 evaluation may not have addressed configuration
- Preliminary Risk Screening may yield 'No impact' or 'Minimal Impact'
- NFPA 80 code of record may allow evaluation
- Alternative approach per Transition LAR will allow 'adequate for the hazard' evaluations

Example 2 - Install A Transfer Switch for a Pump Power Supply

- Assuming pump is a Nuclear Safety Pump
- New switch (and flexibility) SHOULD improve risk
- Reliability (potential failure) of switch could counterbalance flexibility
- Operator manipulation of switch would need to be considered
- Risk decrease identified during Preliminary Screening
- Should consider addition to model
- Even if not installed due to fire considerations, can still be characterized as FP program change

Example 3 - Change To Thermal Hydraulic Supporting Calculation

- Assume calculation addresses valve maloperation
- Re-analysis reduces time to unacceptable conditions by 10 minutes
- Assumed not to pass preliminary screening due to change (changed from 40 minutes to 30 minutes)
- Detailed change evaluation would assess sequences related to valve maloperation
- Acceptability of change measured using NEI 04-02 processes
- Prior approval determined by RG 1.205 license condition risk thresholds

Example 4 - Fire Brigade Training Change

- Would compare against NFPA 805 Section 3.4 and transitioned Licensing basis
- Could potentially affect 'Suppression Capability' in preliminary screening
- If 'Potentially Greater than Minimal', then perform analysis to quantify change (manual suppression factor)
- May need to have the ability to see how 'manual suppression' is credited in the Fire PRA
- Also could potentially affect radioactive release

Example 5 - QA Program Change

- Traditional 'QA Program' not explicit in NFPA 805
- Program change would not necessarily comply or fail to comply with NFPA 805
- Judgment would apply based upon anticipated results or relationship with NFPA 805 requirements

Effects on Non-Power Operational Modes

- Non-Power Analysis focuses on identifying 'pinch-points' to be managed during High Risk Evolutions
- Permanent plant or procedure changes need to be evaluated post-transition for their effect on the analysis
- Examples of changes that may affect the Non-Power Analysis
  - Change to DID Equipment or Success Path
  - Change that effects failures of DID Equipment
  - Change to occupancy of a 'pinch point' area that affects fire modeling that had been done to establish no storage/no welding zones

Effects on Non-Power Operational Modes - Continued

- So given the change how we do the change evaluation?
  - This is a work in progress

Future Updates for NEI 04-02 related to Change

- Additional Questions for Non-power operational modes
- Examples added to Appendix I
- Consistency with Regulatory Guide 1.205
- Unrelated / Related Change Clarification (parking lot)